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11 >

SOLO DESCENT:

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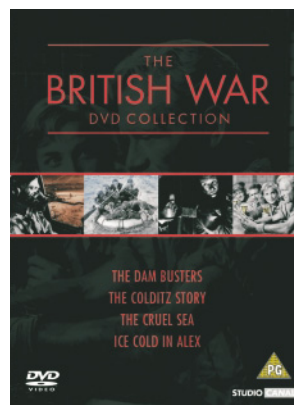
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if we have omitted this then please let us
know and we will correct in the next issue.

Quality not frequency

Editor's letter

We were extremely pleased and honoured to be contacted recently by the Tangmere Military Aviation Museum. They were seeking some advice on setting up a PC flight simulator to complement the marvellous Link trainer that they are currently restoring. After a visit to this excellent museum, we put them in touch with a development team who have agreed to provide some special software. The program will be based around CFS2 and is designed to allow the hordes of eager youngsters who visit the museum to get a taste of flying. It looked like PC Pilot could chalk up another first for flight simulation but, before we could steal a celebratory bottle of Bolly from the PD's fridge, we saw that the Foynes Flying Boat Museum was to use Pilot's B-314 software to re-create the golden age of maritime aviation for their visitors.

We weren't disappointed for long, as this is all good news for flight simulation and is yet another pleasing example of our hobby being exploited more fully for the general good. Aviation museums using PCs to help visitors appreciate our flying heritage will provide wonderful free publicity for our hobby. We are constantly telling the world at large that flight simulation is not a game, and it's good to see this confirmed at Foynes and Tangmere.



Meanwhile, on the subject of history, keen-eyed readers will have spotted that our latest cover is rather different to previous ones. It's a marvellous image, we thought, but don't worry – we're not planning to turn into Film Monthly! This famous still from The Dam Busters film was kindly provided by Warner Home Video and is part of the publicity material for their new British War DVD collection; it contains The Dam Busters (naturally), The Colditz Story, The Cruel Sea and Ice Cold in Alex. Interestingly, the release of The Dam Busters software has caught the imagination of the mainstream press and it even got a review from The Observer's 'military analyst'. This is certainly another first for a flight sim add-on and also shows that the general public can get

quite excited about simulation, given the right angle. Anyway, it's time to get airborne until we see you again in Issue 20, which will be coming out early in December. We've got a busy eight weeks ahead, as we've been commissioned to write a four-page review of 744-PS1 for The Sun!

Dermot Stapleton
Managing Editor

COMMS

mail@pcpilot.net



Take note!

FROM: Eric Pinon

In your Issue 17 report on the new Mosquito Squadron software expansion the author mentions the absence of operational data and guidelines for flying the Mosquito. This useful information is available through the main aviation bookshops as a series of reprints of RAF Pilot's Notes; several WWII aircraft types are still widely available to the public. These small booklets contain most operational instructions, limitations, systems descriptions and typical emergency procedures, and their cost is moderate. One link for purchase in the UK is www.crecy.co.uk.

We reply:

We know that lots of our readers swear by Pilot's Notes, and many of you took the trouble to write in and recommend them. We've got a fair few on our own bookshelves and, as you say, they're exceptionally good value. Surely it would be simple enough for publishers to include at least the essential information of this type in the manuals?



FROM: Frank Allen

I read with great interest and nostalgia your article relating to air gunners. I served my National Service as a Sergeant Air Gunner with 97 Squadron, RAF Bomber Command, in the Avro Lincoln, the successor to the Lancaster. The article is accurate but does not actually reflect the sophistication of the later gunsights. Our training also included 'fighter affiliation' exercises when a Spitfire would mount an attack on our aircraft. My 'office' was the tail turret and many such attacks started from astern. As the fighter closed, the gunner would give the instruction to 'corkscrew port or starboard' as the case might be. The pilot would put the Lincoln through this manoeuvre (it followed the shape of a corkscrew roughly – a pilot would be able to describe this in detail) and the gunner had to try to keep the sight 'on target'.

As it was decreed that the guns were unloaded for this exercise, a camera was fitted to the top of the sight and it operated as the guns were triggered. The resultant film was analysed and scored. This was discussed in conference with all other gunners present.

The gyrations performed by the aircraft, and in particular the tail turret, were something that Alton Towers would be proud of. After such an exercise, my pilot would ask, "Are you alright, tail?" Such was one's constitution in those days that the effect was endured without any problems.

We reply:

We're pleased to hear that you enjoyed the article on air gunnery, and thank you for filling in one of the gaps – clearly the training left no lasting ill-effects! As always, we're constrained by space limitations in many of our articles, but hope they are enjoyable reading both for the newer converts to FS and the older hands, many of whom have more real-world aviation experience than we do flying simulators!

FROM: John McGarry

Anyone know how to open the doors on the A320? I am baffled on this one. Any help would be much appreciated.

Eoin Sutton replies:

Opening the doors is a tricky one. What you need to do is press and hold [SHIFT]+[2]. This will open the two main cabin doors. To get the cargo bay doors to open requires a little more work. Go to Options, then the Controls menu and select Assignments. Change the assignment of the Select Exit option to another key, for example [D].

Next, to open/close the cargo doors, press and hold [D], press and hold [2] then release.



You ARE being served!

FROM: Pete Norval

I have never written to a magazine before, but have recently found an occasion to write and sing the praises of a certain payware company I have had the good fortune to deal with – RealAir Simulations (www.realairsimulations.com).

I recently read that they were about to release a SIAI-Marchetti SF.260 for FS2002, and headed over to their site and immediately purchased a copy for \$25. It looked great in the screenshots, the download went fine, and the self-installer started up all right. BUT it failed to finish the install and I received error messages every time I tried to install it. Devastated, I contacted Rob Young, who almost immediately came back to me with a reply and a number of possible solutions. I tried them all, but nothing worked. After day one of this saga, Rob decided that, for my trouble, and as we hadn't managed to sort the problem out, he would refund my money. E-mails went back and forth between Rob and I for two days, and eventually we did get the problem sorted

out, and I now have an absolutely superb aircraft, worth every penny they charge. To top off this experience, this whole episode ran over a weekend!

What a pleasure it is to find a company which is willing to go so many extra miles to ensure that they have a 100% satisfied customer. If they bring out any more FS2002 aircraft, they can rest assured I'll be first in line.

We reply:

Reports of outstanding customer service are always a pleasure to receive. Ex-pilot Cliff Harris wrote to us from Spain to say how he found the RealAir Simulations Marchetti "nothing short of superb", and went on to mention, "One last thing. I posed a query and received a helpful and detailed reply within hours." Companies and individuals who back up excellent products with first-class customer service certainly deserve a word of thanks, and we'll be looking at RealAir Simulations' gorgeous SF.260 in the next issue.

**FROM: Michael Duncan**

Many thanks for the inclusion of the Lago mesh files on your latest cover disc – I am delighted with the Swiss mesh which I downloaded. As I don't have ADSL on my PC this was much appreciated. I do hope you will carry on supplying your readers with these mammoth files. I attempted to download the FS2002 version of the Netherlands NL2000 scenery, and my Net server cut out, as it only allows a time limit of two hours on the Web at a stretch. Hint... please include the Netherlands scenery at some future date.

We reply:

We've had a fair number of mails from readers outside the Netherlands about this popular scenery. We did ask the authors if we could include it on a cover CD, but they weren't interested. After receiving a mail saying that they preferred to release the scenery on the Internet only, we understand it later appeared in a Dutch PC magazine. We do follow up the requests we receive, but, as you see, some authors are more receptive to the idea than others.

NEWS

SHOW ME THE WAY... TO BIRMINGHAM!

Lago and Lindbergh

It's good to see that as well as Flight One's freeware Spirit of St. Louis release, Charles Lindbergh's awesome achievement is being celebrated by another commercial FS publisher. At some point in October Lago will be releasing a complete FS package devoted to Lindbergh, which is expected to be far more than a simple guide to re-creating the record-breaking flight. More releases are expected to follow in their Century of Aviation series, designed to celebrate the 100th anniversary next year of the Wright Brothers' achievements. We're sure we don't need to remind you just what they were!



Clipper updates

Support continues for the Pilot's B-314 Clipper program in the shape of 23 new water landing sites, including Miami, Lisbon and Buenos Aires. The new sites were programmed by the Bluegrass Airlines VA (www.bluegrassairlines.com) and are available as a free download from <http://b314clipper.com>. An interesting collaboration between Pilot's, Microsoft and Dell computers will be bringing flight simulation to a wider audience at the Foynes Flying Boat Museum, where visitors will soon be able to fly the Clipper in FS2002. Plans are underway to install a full cockpit mock-up at a later date.



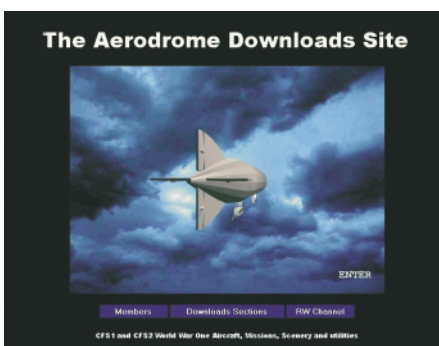
Several exhibitors have been confirmed for this year's European Computer Flight Simulation Show, to be held at the National Motorcycle Museum in Birmingham (just next to the NEC) on Saturday 23rd November. Thanks to a lot of hard work by RC Simulations, it's shaping up to be a great day out, especially for those who fancy a look at a few of the forthcoming sims and some of the more interesting hardware around.

Ubi Soft will be showing off Lock On: Modern Air Combat and their new IL-2 add-on, Forgotten Battles, while the many IL-2 fans will have the chance to shower Oleg Maddox with well deserved praise. You'll be able to take a look at Combat Flight Simulator 3, as well as software previews and product demos from the likes of Abacus, Lago, Aerosoft and Gary Summons. A major draw is likely to be the eagerly awaited photorealistic UK scenery from Getmapping PLC and Just Flight.

Anyone pondering hardware choices will have even more to think about after seeing products from GoFlight, CH Products, Aerosoft, The Real Cockpit, Copy Cat Controls and Thrustmaster, all of which will have representatives in attendance to answer your technical queries. Alpine

Systems will have some rather tasty PCs on display, and you'll be able to see if the latest offerings from ATI, Matrox and nVidia live up to expectations.

Air Supply will be on hand to cater for your book, chart and scanner requirements, and VATSim are sure to convert even more of you to the wonders of their online ATC provision. Even if you're saving up for Christmas, come along, enjoy the many presentations scheduled and have a chat with some friendly faces from the UK FS scene. The show's open from 10am until 5pm, and only costs £7.00 for adults (£6.00 advance) and £5.00 for under 16s and over 60s.



If you're interested in WWI flying in Combat Flight Simulator then it's likely that you've already visited The Aerodrome at www.aer.ip3.com. If you haven't, then it's well worth a trip, especially as they've

A GREAT WAR SITE

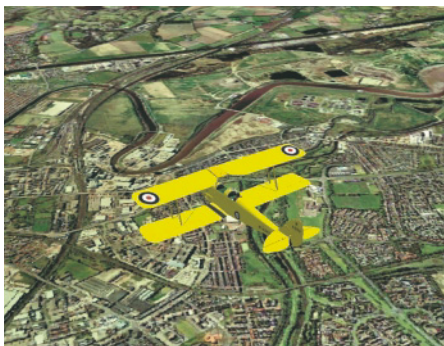
now redesigned the site and given it a great new look. Kevin Parkyn told us, "We've now had over 60,000 visitors to The Aerodrome and there seems to be a large resurgence of interest in online WWI flying using CFS2. We've got over 160 CFS and CFS2 WWI planes for free download (many with Fred Green's pilots that can sustain injuries), an airship, hundreds of utilities for FS and CFS and even scenery. Altogether there's over 700Mb of free stuff for would-be knights of the air." If you yearn for leather, castor oil and the smell of dope, then we can definitely recommend a visit.



RUSSIAN MODELS

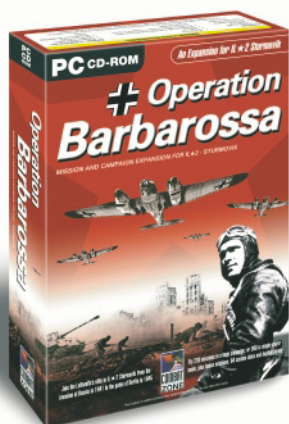
If you're looking to expand your virtual air force in IL-2 Sturmovik, then you can get a taste of things to come with a trip to www.il2center.com. You'll find some tantalising shots of aircraft under development, lots of information for budding developers and even a campaign generator. There's nothing to download at the moment, but there seems to be a flurry of activity behind the scenes.

GET REAL!



We had an absolutely incredible response to our preview in Issue 17 of Visual Flight's stunning scenery, and it's now certain that the answer to UK VFR pilots' dreams will be published soon by Just Flight. The photorealistic scenery, based on Getmapping PLC's Millennium Map, didn't have a name at the time, but we're expecting the final release to be called VFR Photorealistic Scenery of England and Wales Volume 1. Details have yet to be finalised, but the scenery will probably be sold as four separate UK regions, each of which will contain three CDs, at £29.99 per region.

GO EAST!



Following the success of Eastern Thunder, their first expansion for IL-2 Sturmovik, Just Flight is making another assault on the Russian motherland with the release of Operation Barbarossa, due to come out later this year. This expansion will have 230 new, historically accurate missions for IL-2, all playable in a huge campaign mode online or offline, with the missions total rising to 340 in single player mode. There should be enough action to keep the most dedicated member of the virtual Luftwaffe in the sky for months. There'll be over 60 custom skins for co-op missions as well as dogfight maps and a wealth of accurate briefing detail. Let's hope we can get to Moscow before the winter sets in!

Roving reports

If you ever spend time in the ranks of a virtual airline, or just want a handy place to post your own pilot's reports, then you'll be glad of a new feature that's available from Artur Gajewski on his website www.majgaj.com/fs2002. It's a tool called PIREP, which Artur tells us is an online, totally free, easy-to-use pilot reporting and logging tool which is available for anyone to use without registration. It allows a pilot (either real-life or simulator) to enter his or her flight data and later retrieve it along with cumulative flight time calculations and many other options.

History in the air

The Historic Jetliners Group, famed for their freeware airliners from a bygone era, has announced that their long awaited series of early 707 models (the -100 and -200 series) are airborne. Among the aircraft featured is the QANTAS VH-EBM, a 707-138 model from 1964, now owned by film star John Travolta. Other liveries include American, Continental, Pan Am, TWA, Western and Braniff. You can roll back the years at <http://avsim.com/hjg>.



It's all Greek to us!

Following a ruling by the Greek government clamping down on Internet gambling sites, the legislation appears to have gone a bit further and has effectively banned Greeks from playing computer games! The new law has been criticised for not making a distinction between interactive gambling and computer games. "Theoretically the police can arrest you if you are using your PC for playing games or if your employer catches you playing chess or backgammon on Yahoo," said a statement from the Greek Internet Café Union which is fighting the ban. Officials have told the BBC that even though the law bans the playing of games on PCs and consoles at home it will only be pursuing gamers who flout it in public places such as Internet cafes. It may not be long before flight simmers are sharing cells with plane spotters!

Cardinal over the Caribbean!

There's plenty going on at the popular US flight sim specialists Flight One. As well as a marvellous Cessna Cardinal from DreamFleet, they've got some excellent Caribbean scenery from well-known designer Chris Wilkes. The Cardinal is titled 84 Charlie, The Knoxville Flyer, and is an authentic re-creation of an actual Cessna 177 operated by Tennessee flying club The Knoxville Flyers. For full details of the Cessna, and the Islands of the West Indies and Jewels of the Caribbean packages, take a trip to www.flight1.com.



A short hop over Germany

German software publisher Aerosoft has released their much anticipated Eurowings Professional. This new title re-creates regional airline operations in Germany, with four aircraft, six airport scenery areas and 20 liveries in addition to the Eurowings colours. Prospective regional pilots can choose from two ATR-42s, two ATR-72s, a BAe 146 and an A319.



Point and click cockpits

The myriad of knobs and switches that make up the flight deck of the average airliner can be quite daunting for the virtual pilot. It's all very well saying "RTFM", but they are increasingly being provided only on CD, which makes a quick thumb through very tricky. However, help is at hand on Jerome Meriweather's excellent website www.meriweather.com. Jerome has taken a closer look at the flight decks of the Boeing 777, 767, 747, Airbus A340 and A320 and they're all 'point and click' interactive. Pretty well every panel, control, knob and switch in the cockpits is clickable and brings up a description of their various functions. You need never get lost in the cockpit again!

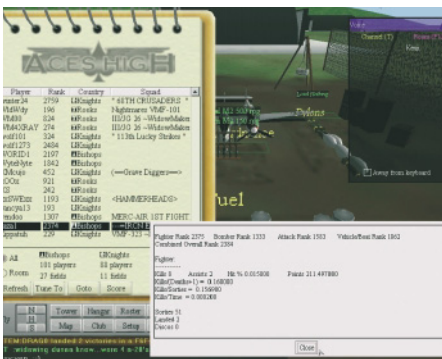
COVER CD

GETTING STARTED

To get the CD running, close all programs and applications and place the PC Pilot CD in your CD-ROM drive. If Autorun is enabled, the program will start and you will see the opening screen and menu buttons. If you don't have Autorun activated, or if the CD doesn't start automatically, press the Start button on your Windows taskbar, move up to Run and left click on it. Type in the Open window: D:\issue_19 (where 'D' is the drive letter of your CD-ROM drive), then press OK and the menu should appear. If all else fails, go to My Computer, right click on the CD icon, and select Explore. You should then be able to open up the folders as required. If the menu buttons won't run, then this may be because they are set up to recognise a D drive. If your CD drive is E, F or G then use the Explore method as outlined above.

ACES HIGH

If our feature on online combat has persuaded you to go hunting some live opponents, you'll need some software to get started. Unfortunately this might mean a large download, and you might also have to fork out some hard-earned cash. Aces High have come to the rescue and, as a new contender in the online ring, they're offering a month's free trial so you can see that it really is as good as they say. On the CD you'll find an .exe file. Run this from the Start menu, and then you'll be prompted for a video mode, after which you should choose Online from the clipboard (make sure you're logged on to the Internet) and then you'll be prompted for a Login ID and password. At this screen, click Create Account and follow the instructions. If you're still playing at the end of your two-week trial you'll be asked for a credit card number. If you choose to subscribe, your credit card will be billed \$14.95 (£10.00 approx.). If you choose not to, eight player head-to-head play is always free.



DEMO PROGRAMS

Search & Rescue 3

To coincide with the European release of this hugely popular helicopter sim, Just Flight has given us a taster of what you'll be searching for and rescuing with in a comprehensive demo. Get weaving! People are counting on you...



Pacific Warriors

If you fancy an entertaining little arcade-style combat flight sim, then try Pacific Warriors. It's from the same team that brought you Search & Rescue 3 and you can find out more at www.iavgames.com.

E-Z Landmark

If your curiosity tends to get the better of you during your flights, then here's a chance to try this new utility from Abacus.

FSLogbook

A handy demo of Lago's logbook. Record your flying career for posterity.

FREE SPIRIT!

Flight One have kindly allowed us to include their Spirit of St. Louis on this issue's CD, to accompany our tribute to one of the world's truly great aviators. Try the flight yourself and you'll see why!



CINEMA ON CD

Grab a bag of popcorn, fire up your PC and enjoy some fine footage of forthcoming flying! Here are three great movies that show off the forthcoming big releases. The CFS3 film is (we think) being used as the intro to the sim, and the Lock On movie gives you a good idea of what to expect next year from Ubi Soft – no sound



unfortunately, but it's still worth seeing for the graphics. Just Flight have also been tinkering with the celluloid so we've included the Dam Busters showreel that kept everyone entertained at their recent press launch.

HEATHROW AND GATWICK

Hats off to Gary Summons! Not only has he offered his Heathrow and Gatwick sceneries for FS2002 completely free to PC Pilot readers, but he's even customised them with a few of our very own advertising hoardings! These sceneries were previously on sale at £29.99, although the versions you'll find here work with both FS2000 and FS2002. No misleading 'optimisation' here! Both airports display Gary's usual high level of detail, and if you want to find out more about his other excellent projects, take a trip to: www.uk2000scenery.bizland.com.

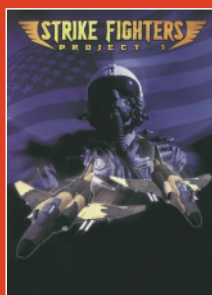


UPGRADE

IL-2 Sturmovik

Forgotten Battles is just around the corner, but in the meantime here's another IL-2 upgrade. Version 1.2 brings you four new flyable aircraft (the Bf-109E-7/Z, Yak-9 and Yak-9D, and Ju-87B-2 Stuka) as well as ten new single-player missions and six co-operative online missions.

PATCH ME THROUGH



This CD comes with an absolute feast of patches, so if your sim isn't up to date, it's time to get installing. We've included a patch for the Wal-Mart version of Strike Fighters, the ultimate Falcon 4.0 upgrade and more.

Flight Deck Companion (On Course Software)

Strike Fighters Project One

Falcon 4.0

Final Approach

Airline Simulator 2

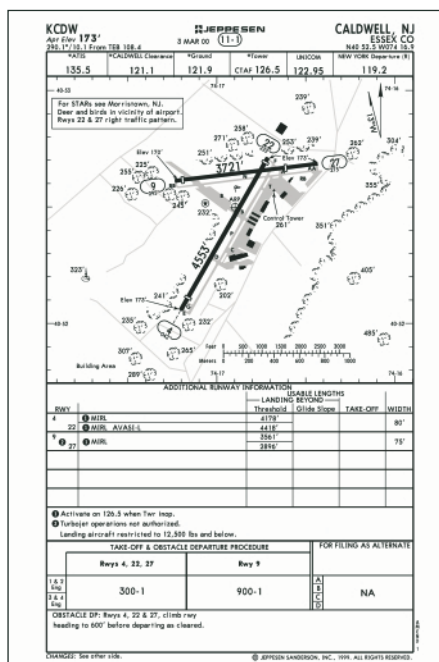
Make sure you check the Readme files thoroughly after you've unpacked a file... but before you install it!

VIRTUAL AIRLINES

We've put the latest list of VAs on the CD, and also included a small description of each one to help distinguish between all these great online airlines.

CHARTS

The official versions of the two Jeppesen charts used in our tutorial are included on the CD in PDF format. If you have any trouble accessing the charts, go to My Computer, right click on the CD icon and select Explore. To view them you'll need Acrobat Reader, which is also included on the CD.



UTILITIES

Peter Dowson

Here's FSUIPC version 2.90 (actually the DLL is 2.901). Also attached is a little utility from José Oliveira which helps with one of the new options in this release.

WINZIP & ADOBE READER

You'll need these important utilities to open up Zip files or read PDF files. Please note that any shareware should be paid for and registered if you want to use it on a regular basis.



IMPORTANT - TECHNICAL SUPPORT

The CD and software on it are free and, as such, neither PC Pilot nor any of the publishers or developers of the software supplied on the CD can provide technical support. The software is supplied very much 'as is' and without support. Enjoy the CD and the software on it!



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Real Pilots choose

PRODUCTS

for their virtual aircraft



CH Flight Yoke USB

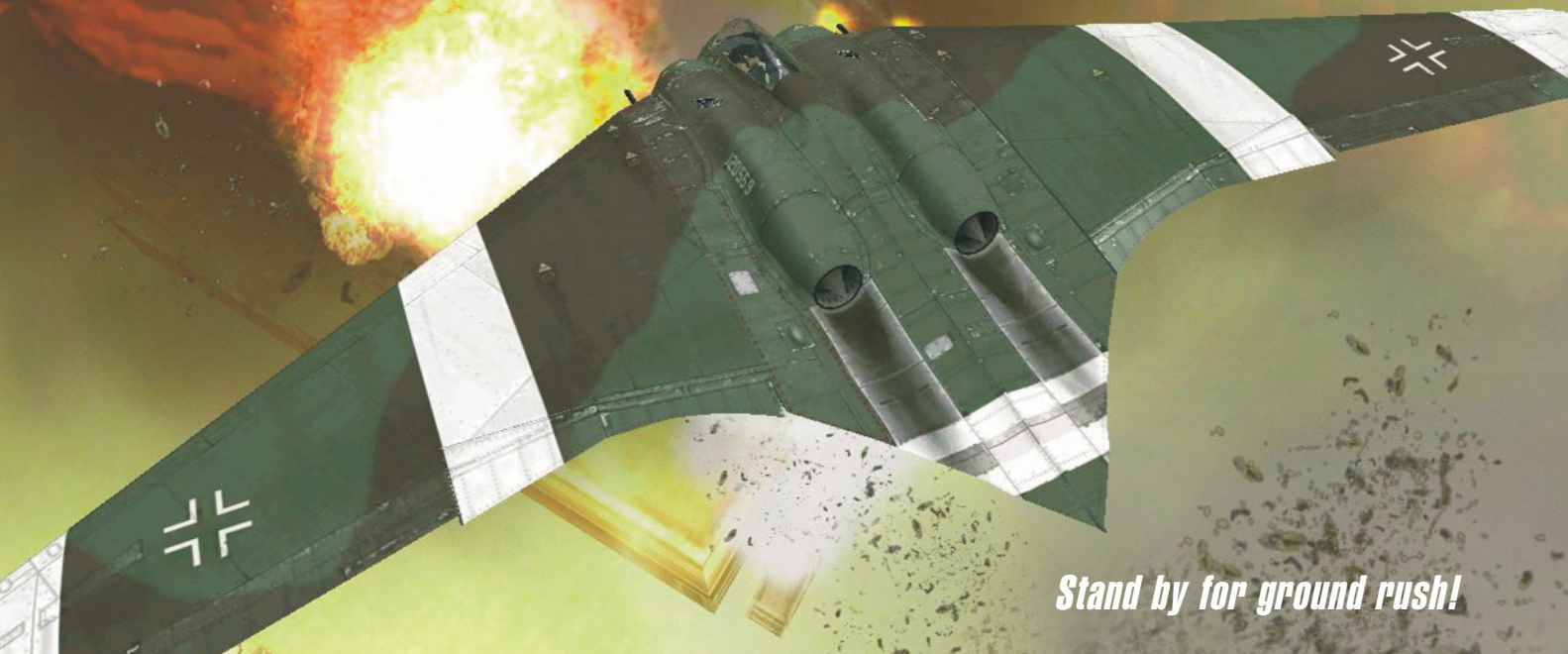


CH Pro Pedals USB
with Toe Brakes



Go Flight Controls

Combat Flight Simulator 3



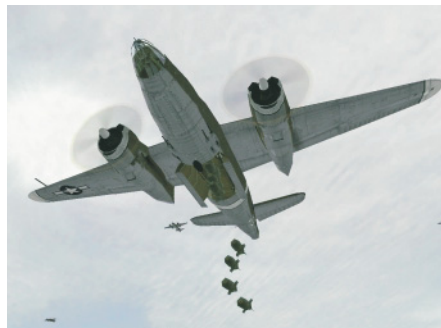
Stand by for ground rush!

It doesn't seem very long ago that Microsoft took the plunge into the wild world of combat sims with the release of the original Combat Flight Simulator. At the time (1998, to be exact) they were up against renowned experts in the genre such as Empire, Microprose and NovaLogic. Flight sims were a lucrative market for the games industry and Microsoft soon helped themselves to a slice of the combat cake with a competent and attractive WWII sim that rocketed to number one in the sim charts. However, as Coriolanus found out, the mob can be a fickle bunch, and by the time Combat Flight Simulator 2 was released flight sims were (apparently) consigned to the scrapheap of history. Microprose were soon to vanish and Empire told us that Battle of Britain was to be their last flight sim. Once again Microsoft had a combat sim that was top of the heap.

Another two years have gone by and things in the world of combat sims are turning full circle, with Ubi Soft taking on Microsoft

head-to-head last year with a corking simulation based on the Eastern Front.

Microsoft has weathered the bad times for combat sims but, with IL-2 flying high and even more competition popping up, the third instalment of Combat Flight Simulator is going to need to be something special if it's to stay top dog.



The Marauder unloads

The main decision Microsoft made was to remain in World War II (no Phantoms, no B-52s, no Sopwith Camels), but they needed a different angle to keep the fans happy. Unlike the Flight Simulator series, each new version of CFS is a complete sim in its own right, not an updated version of what's gone before. Admittedly the graphics tend to improve with each incarnation, but both previous versions are still popular as they each offer different experiences. You'll still find CFS on sale in the shops next to CFS2, but try finding a copy of FS98 in your local Game or PC World.

The original CFS was themed around the Battle of Britain, while CFS2 featured the Pacific campaign, and the smart money would have been on CFS3 focusing on strategic bombing. However, the smart money rarely takes account of political correctness and so heavy bombers were off the agenda. Instead Microsoft have opted to replicate low-level attacks against ground objects, and CFS3 is subtitled Battle for Europe, with a timeframe running from 1943-1945.

Traditionally, CFS has been developed by the same team that worked on Flight Simulator and there was usually some common ground between the civil and not-so-civil sims. Microsoft has now split their gang into two distinct groups, however, and this means that CFS3 and FS2004 are taking different paths to production. The major features of CFS3 that will distinguish it from its illustrious forebears are new aircraft and lots more of them – 18 different types and 16 additional variants. In line with the



Serves you right for being nose!



Bang goes a quiet night in!

ground attack theme there are some great 'busters' such as the Thunderbolt and Typhoon, and the light bombers get a look in too, with Marauders, Mitchells and Ju 88s dropping bombs or even seeing off fighters. Yes – CFS3 comes with air gunners! Now you can leave the flying to an AI pilot who will carry out the mission while you sit in one of the turrets and fight off the foe. In multiplayer mode you can even get together with your mates and crew a bomber. "Bags I'm the gunner!" "OK, but you're in the tail – I was tail-end Charlie last week." Eat your heart out B-17 II!



"I love you, Invisible Woman!"

The list of features goes on and on, but the one that the Microsoft team is really excited about is the terrain. The good news is that it's hugely detailed – down to 70m in some areas. This is designed to really highlight the ground attack role, because diving down on trains and tanks is not for the faint-hearted – especially when you see the trees looming and watch the leaves trembling in the breeze. Well, not every leaf, but you get the idea. Unfortunately, the trade-off for all these pinpoint pixels is that the whole graphics engine is so different from CFS2 that none of your old add-ons are likely to work. They say this every time, but now it does rather look as if they actually mean it. However, everything has been designed in gmax, so any gmax planes should theoretically be compatible, but we'll only know for certain when we've tried it.

Mission creators will also be disappointed to hear that CFS2's mission editor has gone, but it's been replaced by a changing campaign environment and a role playing environment for the crews that includes skill points for you to allocate. Give your pilot all



The Dornier Do 335. A push-me-pull-you but no sign of Dr. Doolittle

the points on his eyesight and he'll spot a bandit from miles away, but if his g tolerance and health are too weak, he won't pull tight turns or last long when wounded.

Finally, in what's probably the biggest departure from previous versions, is the appearance of planes without props. It's true – CFS3 has got a gaggle of jets in the hangar as well as some piston-engined stuff that's also pretty radical! The Luftwaffe gets the Me 262, which saw plenty of service, but also the Dornier Do 335, a push-pull speed machine that was only built in small numbers. It's possible that, when they evaluated them after the war, the French and British flew more hours in 335s than the Germans ever did! There's also a flight of fantasy with the Gotha Go 229A, a tailless jet bomber that never really saw much sky. You may not be surprised to hear that someone from the Secret Weapons of the Luftwaffe team is working on CFS3.



This looks like a breach of the Clean Air Act

To counter the German jets, Microsoft has (strangely) opted for the de Havilland Vampire and the P-80 Shooting Star. Both jets were not operational until after the war, so this is very much a 'what if' choice of planes. If you're missing Crimson Skies, they've also plonked in the Curtiss Ascender with its odd canard wing and pusher engine, but they've doubled the horsepower to make it work properly.



They've even modelled typical British weather

The hype sounds great, but will it be any good? The answer is a resounding yes. We've flown it already and it looks brilliant. The low-level effects are stunning and the role play-style campaign is interesting. The choice of planes will baffle many of us, but

The CFS3 Hangar

The selection of flyable planes is much larger this time round, and CFS3 comes with 18 new steeds for combat jockeys to whip round the course.

USAAF Aircraft

Curtiss XP-55 Ascender
Lockheed P-38L Lightning
Lockheed P-80A Shooting Star
Martin B-26C (and F/G) Marauder
North American P-51B and D Mustang
Republic P-47D and P-47D-25 Thunderbolt

RAF Aircraft

de Havilland Mosquito B.Mk IV, FB.Mk VI and FB.Mk XVIII
de Havilland Vampire 1
Hawker Typhoon 1B
Hawker Tempest V
North American B-25C/H/J Mitchell
Supermarine Spitfire L.F. IXC/E

Luftwaffe Aircraft

Dornier Do 335A-1/B-2 Arrow
Focke-Wulf Fw 190A-5/A-8
Gotha Go 229A-0
Junkers Ju 88A-4/C-6/P-4
Messerschmitt Bf 109G-6/G-10
Messerschmitt Me 262A-1a Swallow/A-2a Stormbird



no doubt the third-party and freeware boys will soon start tinkering and we should get our favourites back before long. However, unless you've got a particularly small hard drive, we suggest you don't delete CFS and CFS2. You should soon be able to dogfight in a 109 over Dover, remove a Zero hero at Midway, or blow up a train from your Thunderbolt. Two was company but three will be a blast!

Derek Smalls

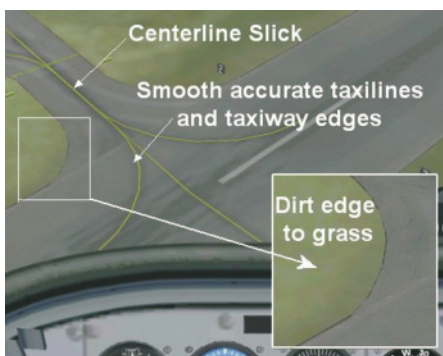
Preview Information

Publisher: Microsoft
Price: £34.99
Website: www.microsoft.com/games/cfs3
Developer: Microsoft
Expected Release Date: 15th November 2002

UK2000 Part 5 "The Midlands"

Airfields of dreams

For the vast majority of those living in the UK, airports are at best a handy place from which to start an aeroplane flight, and at worst a noisy blot on the landscape. For aviation enthusiasts, on the other hand, they are a source of great excitement, and their form and function are things to be enjoyed. Scenery designer Gary Summons is definitely an airport connoisseur, and there's no denying that his previous airport scenery designs for Flight Simulator are some of the best to be found.



Landscaping an airfield the Summons way

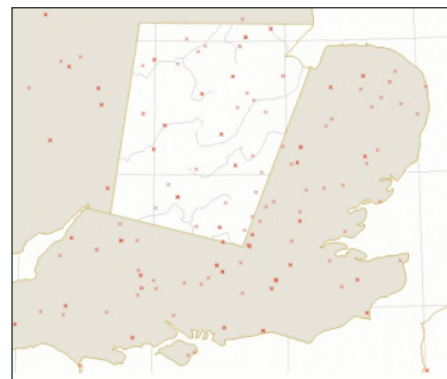
Gary's latest project is the fifth part of his UK2000 series, aptly named UK2000 Scenery Part 5 "The Midlands". This is not a simple update of his old UK2000 files, but a new set of over 40 airfields in an approximately rectangular area that stretches from The Wash down to near the Bristol Channel. The selection for Part 5 includes some interesting locations, and ranges from international airports such as Luton, East Midlands and Birmingham to small fields like Langar, from where PC Pilot's Managing Editor began a mercifully brief career as a skydiver.

For the design of each airfield, Gary is starting with the ground images, followed by perimeters, trees, bushes, buildings and all the other authentic minutiae that we've come to expect. The detail level will be an improvement over previous offerings, with higher resolution ground images (32-bit) and a new taxiway system that you can see in our screenshot. As with all his other scenery, Gary relies on a combination of detailed research, visits to the airfields, and photographs taken by himself and other enthusiasts, to build up a comprehensive information file on each airfield.

The biggest criticism of detailed airport scenery concerns the effect it usually has on frame rates; huge detail levels can often reduce a difficult approach to a jerky slideshow that results in a crash. Gary reckons that you can run his scenery on an 800MHz machine with the scenery setting at 'Very Dense'. Our previous experience with his scenery areas suggests that this is an accurate estimate, and today's crop of 1.5GHz-plus machines should cope admirably.



Booker Airfield shows off the 32-bit ground images



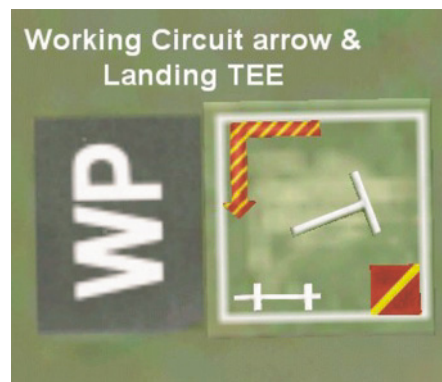
The area covered by Part 5



Skydivers at Langar. PC Pilot's editor is hiding in the toilet

The expected release date is October 2002, and you'll be able to purchase either by mail order for the CD or by download from Gary's site. He's decided to stop selling shareware products after becoming the victim of some well-publicised piracy, but demo files will be available to prospective buyers who might like to take a look before committing themselves; keep an eye on the news at the UK2000 website for more details of release dates. Middle England has never looked so beautiful!

Derek Smalls



The detail goes beyond grass and tarmac



The buildings are in - this is the tower at Fenland

Preview Information

Publisher: UK2000

Price: TBA

Website: : www.uk2000scenery.bizland.com

Developer: Gary Summons

Expected Release Date: October 2002

Strike Fighters Project 1



Phantom sim materialises...



Although the release of Lock On has been put back to next year, those of us who have been dusting down our g-suits in readiness for a new combat jet sim will still have something new to add to our Christmas lists. It's been quite a while since we first set eyes on some appetising preview screenshots of Strike Fighters Project 1, but Just Flight have confirmed that they will be releasing it in the UK – and hopefully the rest of Europe – in November, with a likely price of £29.99.



The Skyhawk - sometimes called the Bantam Bomber

At the head of the development team, Third Wire Productions, is the renowned Tsuyoshi 'TK' Kawahito, the man behind 1998's award-winning European Air War and the earlier Jane's Longbow titles; his pedigree as a developer suggests that Strike Fighters should be an impressive standalone sim. Star of the show will be the versatile McDonnell Douglas F-4 Phantom II, and other flyable aircraft featured will number the F-4 Phantom II, F-100 Super Sabre,



In the F-4 pilot's seat

F-104 Starfighter and A-4 Skyhawk among them. A full supporting cast, including several MiG variants, a Canberra and a Hercules, should keep things interesting.

The action takes place in the 1960s, when jet combat technology was relatively primitive by today's standards, yet developing rapidly. Some missiles will only become available as you progress through the missions and will sometimes be authentically unreliable and inaccurate – how's that for historical realism! In addition to the usual instant action mode, single missions and full campaign, Third Wire Productions are appealing to our dark sides by including the option to fly as a mercenary pilot. Build up your resources and cash to buy fuel, repair battle damage, obtain ever more fearsome weapons, and upgrade your aircraft – a novel idea, and one which we're looking forward to trying.

It has been stressed that Strike Fighters has been developed to support third-party add-ons and expansions, and full tools will be made available on release. There are already some expansions in progress, including a whole new theatre map based on the Vietnam conflict. A new graphics engine using DirectX 8.1 should mean that Strike Fighters will be as good to look at as it is to fly, and an advanced terrain engine has also been promised.

While those of us in the UK only have to sit tight and wait for the release date, it appears that things may be a little more complicated for our friends in the US. Copies of Strike Fighters appeared in branches of Wal-Mart and Best Buy well before the projected US release date, and it would appear that the program contained numerous bugs. A patch has already been provided, which we've



Detailing looks good on the F-100



Nowhere to run, nowhere to hide

included on our cover CD, and another one due in October should bring the Wal-Mart version up to the standard of the final release. Keep an eye on www.strategyfirst.com and www.thirdwire.com for updates if you happen to own one of these copies. Strike Fighters will be the only combat jet sim to see the light of day this year and, if it lives up to expectations, it should be a winner. ■

Joe M. Besser

Preview Information

Publisher: Just Flight
Price: £29.99
Website: www.justflight.com
Developer: Third Wire Productions
Expected Release Date: November 2002

The Dam Busters

Skipping stones may break my bones



Following a "Eureka!" moment, Sir Barnes Wallis's bouncing bomb proved to be one of the most innovative weapons of the Second World War. The dams of the Ruhr Valley were at the top of the target list in the Allied commanders' attempts to strike a lethal blow to Germany's industrial heartland. They were, however, extremely well built, and apparently indestructible by conventional air attack...

Cue one certified genius who, with the help of his children and an iron bath, perfected the idea of the Upkeep mine. Shaped like an oil drum, rather than the huge football depicted in the famous Dam Busters film, the bomb was designed to spin, and so bounce along the surface of the dammed reservoir and skip over anti-torpedo nets lurking below the surface.

Dams are, of course, built to withstand millions of tons of water pressure, so it takes something special to burst one. Wallis was fully aware of this, so the Upkeep wasn't designed to blow the dam up by itself; on striking the dam, it would roll down into the water before exploding, and thus create a huge shockwave that would rupture the dam. This seemed straightforward enough but, as with all revolutionary ideas, working out the actual details was more complicated. All the practicalities had to be fully tested before Operation CHASTISE could be put into action and the dams attacked – and this is where you step in.

Development team Blue Arrow has pushed the boundaries of Combat Flight Simulator 2 to allow you to fly the key WWII missions of 617 Squadron as realistically as possible. As developers of the Mosquito Squadron and Battle of Britain Memorial Flight add-ons, Blue Arrow has been able to customise the excellent aircraft from these previous projects for this historical re-creation of the raids undertaken between 1942 and 1945.

The unmistakable Lancaster B1 aircraft is reproduced beautifully here, with the Upkeep mine hanging menacingly underneath the bomb bay. There are also versions of the standard B1, and the B1 with the devastating Tallboy bomb bolted to its fuselage. The Mosquito Mk. XVI that was used for marking bomber targets looks, unsurprisingly, similar to the Mk. VI featured in Mosquito Squadron; this is no bad thing, as the detailing inside and out is second to none, and the Wooden Wonder is a treat to fly. Completing the trio of planes is the Wellington Mk.III, used for bomb testing in 1942.

All of these aircraft look wonderful, and have detailed moving components, transparent canopies and crewmen who look the part. Switch on the lights in the Lanc and, from an external view, you'll see the twin spotlights converging on the



The Lancaster B1, pride of 617 Squadron



Welcome to the team



"Listen very carefully. I'll say this only once..."

ground to let you know if you're at the correct altitude for the bombing run. While this doesn't help hugely in practice, it's a nice touch. In real life the pilot relied on his flight engineer to watch the lights, so it's authentic enough as well. The cockpit panels are excellent, as are the virtual cockpits and superbly reproduced bomb aimers' stations.

The developers have been obsessive in not only making decent aircraft models, but also in getting the tiniest details just right, so that Dam Busters is as true to life as possible. Squadron markings have been reproduced on the flyable aircraft (although not on the wingmen's), and the call signs for the accompanying aircraft are also authentic. Radio traffic throughout the missions is totally new, and the accents are wonderfully

British. Destroy your objective and you'll be rewarded with a hearty congratulatory message from your wingmen before a Morse code message is fired off to HQ to notify them of your success. We won't give everything away, but the feeling of being part of the RAF's crack bomber squadron on the raids is certainly heightened by these little touches.

On launching Dam Busters from its custom desktop icon, you have the option of flying missions either in authentic night-time conditions or during daylight to make it easier to target spot. Turning out the lights is recommended for the full effect – it makes quite a difference if you let your vision adapt to the dark conditions onscreen, and changing the Gamma setting on your graphics card is advisable too.

From beach to buster in six months

In just six months Wallis's dream progressed from the drawing board to devastating reality, although without the immense skill of 617 Squadron's crews it would never have been possible. Follow Operation CHASTISE all the way from first testing at Chesil beach, practice raids against the Derwent dam, then the Mohne, and finally try to breach the Sorpe dam. The second dam destroyed by 617, the Eder, isn't included due to the complications in putting 'destroyable' dams into CFS2. The other two are enough to hone your skills and see if you can earn the title of Dam Buster.



Fingers crossed for the first bouncing bomb test at Chesil beach



Check the recon photos to familiarise yourself with the target



Here we go – show time at the Möhne dam



The waters have definitely broken



The Sorpe. Different dam, different angle



The Upkeep mine, spinning its way into legend

As with other recent CFS2 add-ons, custom splash screens let you set the scene for this truly British affair, and you can either tackle the missions individually or in chronological order as a campaign. Taking to the skies in a Wellington is your first assignment, ready to test the first bouncing bomb and maintain precise altitude and heading for the drop. The task seems simple enough: fly at 150 feet and 180 knots to drop the bomb onto the first buoy so that it comes to rest at the second buoy. Remember, though, that this is 1942, and so there's no autopilot or terrain-following radar to help you. It's down to



The Wooden Wonder is the Lancaster's perfect companion

sheer piloting skill and keeping the plane trimmed to perfection; even the smallest deviation is courting failure.

It's this precision bombing that was 617 Squadron's trademark, and it was absolutely necessary if there was to be any chance of breaching the Ruhr Valley dams. Chesil Beach is the location for increasingly difficult practice missions that switch to Derwent Dam, and then you can head out to strike the Möhne, Eder and Sorpe dams in full combat conditions. Read the mission briefings carefully – they contain a plethora of historical information, and the recon photos are truly useful for identifying the target and its surroundings; you'll need all the help you can get.



It may look crude, but the nail-and-stick sight worked admirably

The familiar sound of the four Merlin engines coughing into action on the Lancaster has plenty of character. The default panel view shows off the custom instruments nicely as the engine revs rise, but being unable to see the ground does make manoeuvring tricky. Luckily there's a high-visibility panel of essential flight instruments, that only takes up a strip along the bottom of the screen, or a full-screen head-up display mode for those who aren't fussed about authenticity.

A look around reveals your wingmen all lined up and ready to roll, so fly smoothly to avoid any mid-air mishaps during the climbout. Thanks to the warp feature in CFS2 you can skip straight to key waypoints along your mission route, although purists



The Lancaster cockpit is faithfully reproduced in normal 2D panel mode...



...but the high-visibility mode is useful for take-off and landing

may want to fly the route proper. At each point your crew will keep you informed of any necessary actions, but be prepared for heavy flak, power lines and anything apart from a smooth and incident-free flight to your target.

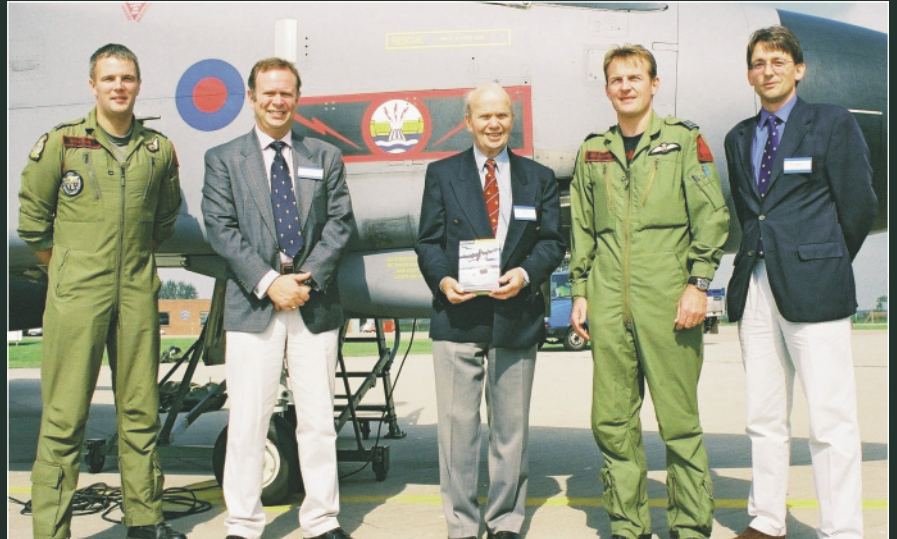
Once you've made it through to the Ruhr Valley, you have to warp one last time – to Holland! Due to problems with the default CFS2 German scenery, Blue Arrow has recreated the Möhne and Sorpe dams in Holland so that they can include full bouncing bomb and dam bursting effects. That's if you manage to hit the target, of course. Practising is hard enough, but now you have to trim the aircraft to maintain 60 feet and 190 knots in the black of night while under fire. [Shift]-[N] brings up the bomb-sight, an accurate rendition of the two-nails-in-a-stick contraption devised to allow the bomb aimer to line up the towers of the dam and release the mine on target. Once it's released, you can see the mine hit the water and, if you're on the money, the dam will burst and water will flood into the valley below. Chalk up another success for the Dam Busters!



Well hello, Tallboy!

Old meets new and real meets simulated

According to Just Flight's Product Manager, Alex Ford, The Dam Busters is the most technically advanced and accomplished product they've ever designed for the Combat Flight Simulator series. Despite the constraints of working with software designed for fighter combat, Just Flight and Blue Arrow have built a bomber sim that accurately reproduces some of the most complex raids of the war. To launch this landmark product on the world, Just Flight chose Coningsby, one of 617's former bases and now the home of the Battle of Britain Memorial Flight. Hospitality was arranged in the Petwood Hotel, which was the officer's mess for 617 during the war. As well as the 'gentlemen' of the press, the guests included Sqn Ldr Bob Knights, a veteran 617 pilot who recounted some exciting stories from his time on the squadron. The press day was considerably livened up by a close look at the BBMF aircraft, inside and out, guided tours of 56(Reserve)Squadron Tornado F.3s (also based at Coningsby) and a really close look at a Tornado GR.4 bomber, which then gave a special flypast crewed by Sqn Ldr John Lawson and Flt Lt Andy Turk of the present 617 Squadron. It was certainly the most impressive launch we've seen for any FS product and if the press reaction was anything to go by, The Dam Busters is a hit on target!



Just Flight's Andy Payne and Mungo Amyatt-Leir with Bob Knights, Andy Turk and John Lawson of 617 Squadron (1943-2002)



Practising at Derwent dam, but don't drop any bombs!

The Sorpe dam raid is slightly different, as it requires attacking along its length, and the target must be marked out in the fog by dropping flares. It's every bit as demanding as the Möhne raid, and the manual explains the best tactics for a successful bombing run, as it does for the other 24 missions

included in the package. Destroying dams is what 617 Squadron is best remembered for, but many of their other historic raids are also reproduced here. Massive Tallboy and Grand Slam bombs are used on missions to devastate power stations, rail yards, V1 and V2 bases and the Tirpitz. The finale is trying

The other raids

After the famous raid on the Ruhr dams, 617 Squadron became established as Bomber Command's elite squadron and, almost without exception, it was made up of crews who had already completed at least one tour of ops. One such crew was skippered by Flt Lt (later Sqn Ldr) Bob Knights and they volunteered for 617 after finishing a tour with 619 Squadron.

When he applied to join the squadron, Bob was interviewed by Group Captain Leonard Cheshire and, once he was accepted, his subsequent career was to include many of the raids featured in The Dam Busters package, including the bombing of the Saumur tunnel and the famous attacks on the Tirpitz.

As well as the 'bouncing bomb', Barnes Wallis also invented the highly accurate (and expensive) Tallboy bomb. When 617 Squadron began using these bombs, Cheshire realised that total accuracy was essential if the bombs were not to be wasted. With the help of Flt Lt 'Mick' Martin, he perfected the art of target marking by dive-bombing the aiming point and dropping a target marker flare. The rest of the squadron would then drop their bombs on the flare. Bob Knights told us this tactic was so accurate that on the Saumur tunnel raid one of the first bombs landed on the flare and blew it out! Unperturbed, Cheshire went in again and dropped another flare. The tunnel was successfully blocked and remained so until the end of the war.



Sqn Ldr Bob Knights DSO, DFC



The accuracy of 617's Tallboys can be seen on this reconnaissance photo of the Saumur Tunnel

Fields of fancy

617 Squadron was based at several airfields since its formation in 1942, and although RAF Coningsby is notably absent from this add-on, this is not an oversight by the developers. Their previous Battle of Britain Memorial Flight included RAF Coningsby and they wanted to avoid possible scenery conflicts for users with both add-ons. The base at Woodhall Spa is used for the majority of missions, and the raid on the Tirpitz is flown from BA Yagodnik in Russia. The dam raids are flown from custom scenery for RAF Scampton in CFS2, but Woodhall Spa is the only airfield included for FS2000/2002 users. The Derwent and Ruhr Valley dams are also included, with flight plans that allow you to fly the missions against the dams – without dropping any bombs.



Home Sweet Home – RAF Scampton



Woodhall Spa looks the part in CFS2

to take out Hitler's winter residence at Berchtesgaden. Some missions require you to fly Mosquitoes to mark the targets with flares, and others to fly the Lancasters to hit the targets previously marked by your wingmen in their Mosquitoes.



Practice makes perfect in the Wellington

The 25 missions in Dam Busters are all challenging, but the difficulty levels of the dam raids may seem a little low in comparison to some of the other missions; you don't actually have to maintain perfect altitude and speed to score a good hit, even on the hardest of the three difficulty settings. We managed to take out the dams without too much practice, but the great sense of achievement was diluted when we realised how far off the attack profile we were. This isn't to say that the missions aren't exciting – far from it, as they ooze atmosphere, but unlike other CFS2 add-ons involving air-to-air combat, the 'replayability' factor suffers.

Using combat add-ons in FS2002 isn't recommended, for obvious reasons, and anyone using this package in Flight Simulator 2000/2002 only gets the rather sparse Woodhall Spa airfield, three aircraft to fly, and some flight plans that recreate the route over the Derwent dam and those over Germany.

Dam Busters can't match the sophistication of a dedicated bomber sim such as B-17 II, where you can take up gunnery positions, but this is largely a result of limitations in the host sim, CFS2. With Combat Flight Simulator 3 already taxiing for take-off, and its detailed support for bomber operations, we can expect greater things in the future, but for now Dam Busters is a faithful reproduction of the exploits of 617 Squadron that should keep even the fussiest aficionados happy.

Kenji Takeda



The spotlight altimeter; keep the beams lined up correctly and you'll be 60 feet off the ground

Review Score

Publisher: Just Flight

Price: £24.99

Website: www.justflight.com

Developer: Blue Arrow

At a glance: A detailed historical re-creation of a famous squadron's legendary WWII missions. 25 atmospheric raids for CFS2 will keep budding bomb aimers happy, but others may find the replayability limited.

System Requirements: PII 450MHz, 64Mb RAM, 8Mb 3D graphics card

Recommended: PIII 500MHz, 128Mb RAM, 32Mb 3D graphics card, 3D sound card

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LAUNCH OFFER : £ 23.50 - 36.95 Eur (price after release : £ 25.50 - 39.95 Eur)



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Austria PRO (Aerosoft)	£ 28.50 - 44.95 Eur
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Price : TBA

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Combat Flight Simulator 2 Add-ons



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£ 22.95 - 35.95 Eur

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£ 22.95 - 35.95 Eur

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£ 23.50 - 44.95 Eur

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The Boeing 737 FMC User's Guide (Bill Bulfer)

£ 37.50 - 58.95 Eur

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Models



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The first technology to support up to three displays from a single graphics chip!



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Veggieburger for the guitarist?

You have to hand it to Lago for innovative and imaginative thinking. Whilst scenery for commercial airports has been developing with more and more activities related to the serious business of airport operations, Emma Field takes this concept a step further – into the social world of leisure flying. This fictional small airstrip and flying club is somewhere not too far from Seattle, in Washington State, USA, and is actually located at N47 W123.



Members' tastes may leave a little to be desired

Emma Field is essentially an animated scenery add-on which includes extras more likely to be found in mainstream computer games, and is focused on the activities at the airfield and club. The PDF manual provides a detailed list of what goes on, but you'll find the grass being mowed, Fritz (a general mechanic and club handyman) going about his business, barbecues, social events and even live music at certain times. Cars and trailers come and go in the parking areas, the gates are opened and shut by the ubiquitous Fritz, and appropriate sound effects are also included.



Glider pilots will feel at home here

What makes Emma Field particularly intriguing is the fact that all the activities depend on the time and season in which you visit. Winter is naturally a quieter time than the summer months, when you can expect to see the airfield come alive, storks flying, smoke from camp fires, and plenty of planes aloft. Don't worry if you're thinking that this all sounds rather like The Sims in an airfield setting, because the aviation elements of the program haven't been forgotten.

Glider arrive in trailers, are assembled and take to the air, and various AI light aircraft come and go. One innovation we liked was the ability to switch on a pathway in the sky to indicate a recommended circuit and holding pattern. Gliding is clearly a major activity at Emma Field, and the glider pilots among you can launch either with a tow from an aircraft or from the winch. The active runway changes with the wind direction.

Near to Emma Field there's a small strip at Cushman Field; there are no facilities here, but it's a great place to practise short-field landings and take-offs. Cushman Lake has a detailed jetty for floatplanes, and a couple of boats are provided should you wish to take a look around from the water.



Relax – it's the weekend!

With all this activity going on, a relatively fast PC is required to get the best from the program, and popping in now and then throughout the year is a pleasurable diversion when you need a break from serious aviation.

Emma Field deserves praise for breaking the mould of FS enhancements, and future possibilities for this type of add-on are limitless. If you feel the need to relax around fellow flyers in a pleasant rural environment, with no pressures and plenty to discover, you'll be happy to join the club.

Christopher Jarman



Fritz – you'll be seeing him around

Review Score

Publisher: Lago

Price: €25.00 download (£16.00 approx.)

Website: www.lagoonline.com

Developer: Lago

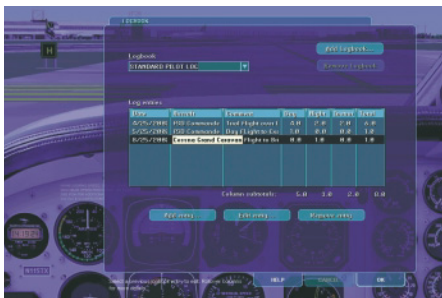
At a glance: An innovative idea and an entertaining one. The shape of things to come?

System Requirements: PII 750MHz, 64Mb RAM, 16Mb 3D graphics card

Recommended: P4 or Athlon 1.5GHz, 64Mb RAM, 64Mb 3D graphics card



One of the most important documents any real pilot has to manage is their logbook; it not only keeps a record of any flights made, but also provides a running total of hours flown, the aircraft types a pilot is allowed to fly, and whether the pilot is compliant with their club's rules. The logbook is also an official legal document, so it's important that the data it holds is accurate and kept fully up to date.



Colourful, but nowhere near as comprehensive

Those of you who fly with Microsoft's FS2002 will know that the program comes with its own rudimentary log facility, but it's nowhere near as detailed as it could be. In contrast, this latest release from Lago stores a tremendous amount of information, covering up to five different pilots and, beginning with your personal data, includes any qualifications you hold. The flight data itself is entered on a form not unlike a real IFR flight plan (but easier to complete), with drop-down boxes for aircraft type, registration, PIC (Pilot In Command) and

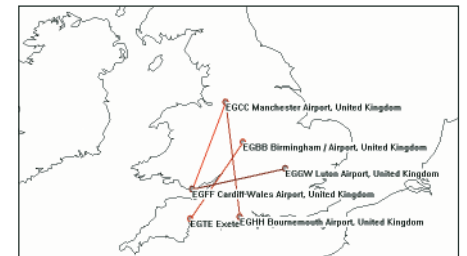
co-pilot. Incidentally, these drop-downs will automatically reflect your own system settings and the pilots available for the flight.

FSLogbook also stores the departure and destination airfields together with the type of procedures you intend to perform, again taken from the data on your own system. Then, finally, it records the times of departure and arrival and calculates the total time flown.

User information for up to five pilots

The Flight Database displays this information in a similar format to the flight data, with the addition of running totals at the bottom of the screen. These are automatically separated into individual boxes to identify the number of hours flown in each of the different categories; for example PIC, co-pilot, night, instrument and autoland. Unlike a real log, you can go back and edit or delete the data, export it to a text file or print it. This would be extremely useful for any virtual airline crew who are required to file accurate and comprehensive flight reports to their hubs.

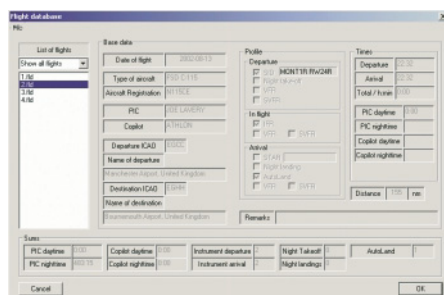
Although the program interacts very well with FS2002, it's actually a standalone product that offers two methods of entering your flight plans. You can enter the data directly from the flight data form, which in most cases simply entails choosing from a list of appropriate items, or you can import the data from a normal FS flight plan. This option also allows you to incorporate data from FSMaintenance if you have it installed. The main screen displays a map that will show the last five plans entered, in colours of varying intensity, the brightest signifying the most recent flight. It can also display the airport names and ICAO codes if you wish.



The flight plan display – clear and simple

This is an intelligently implemented program, which improves considerably on a feature of FS2002 where more imagination might have been expected and, in common with most Lago products, a limited version can be evaluated before you decide to buy.

Joe Lavery



The flight database compiles the data into an easily readable set of totals



Keep a record of your global air miles

Review Score

Publisher: Lago
Price: €15.00 (£9.50 approx.)
Website: www.lagoonline.com
Developer: Lago

At a glance: Far superior to the default log; incorporates a map showing your current flight plans, and can export data to a text file.

System Requirements: PIII 400MHz, 128Mb RAM, 32Mb 3D graphics card

Recommended: P4 or Athlon 1.5GHz, 256Mb RAM, GeForce3 or 4 graphics card

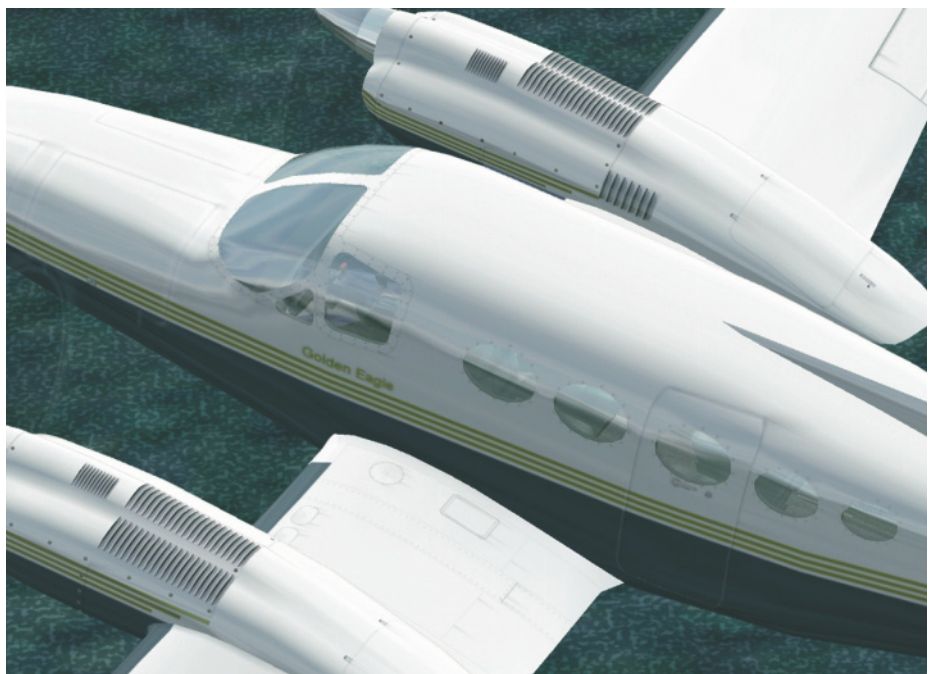
Cessna 421C Golden Eagle



Soar like an Eagle

Although we virtual pilots become very blasé about jumping into any new aircraft, with very little consideration for different performance levels or panel arrangements, it's obviously rather different in the real world, where you would need some degree of tuition just to change between models in the same class of airframe. If you were moving up to a twin-engined aircraft such as Cessna's 421C Golden Eagle, then you'd probably need a full course of perhaps 23 hours before you could fly it solo. This is a good reason for even real pilots to grab a copy of Flight One's new baby, because it provides a genuine insight into the real plane's flight characteristics and instrumentation.

If you've ever stood alongside a Cessna 421C, you'll already know that it's a beautifully designed aeroplane, with sleek aerodynamic lines that just ooze quality. It was first built in 1963, and aimed at the



Look at the detail on those cooling vents



Flight One's co-pilot seems to have the right qualifications!

lower end of the executive market – those who could not afford, or justify the cost of, a Learjet. Like all twins, it's an expensive aircraft to operate and, with two turbocharged 375hp Continentals to maintain, it was generally considered to be well beyond the pockets of most PPLs. Complete with a pressurised cabin and eight luxurious leather seats, it's certainly not designed for the occasional leisure flyer.

Although we can sometimes be critical of add-ons that contain just a single aircraft, the Flight One 421 model is beyond reproach; having flown it over the past few weeks we have yet to find a flaw in anything, from the excellent gmax modelling by Roger Dial and Steve Small's flight dynamics, to Mike Hambly's sound set. They all combine to create a superb 'must have' aircraft. The airframe



Sheer class throughout

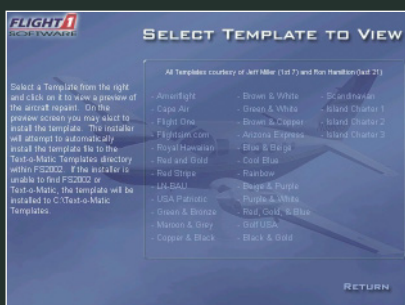


GPS is something special



Panel 'hot spots' hit the spot

Fancy a new look?



See if the colours match your outfit



Check the aircraft preview



Away you go!

modelling in particular is superb, particularly around the engine nacelles and cooling grills. Look as closely as you like, but there's no sign of any angular polygons; this is one of the most detailed models we've seen.

Open the door (yes, they open) and climb aboard, and you'll see that the visual detail is not confined to the exterior. The panel and gauge designs contain some innovative elements to make flying the 421 somewhat easier. There are 'hot spots' around the panel, for example, that enable you to enlarge different gauges with a single mouse click; the six primary flight instruments, engine gauges, fuel totaliser and GPS all have this facility. The GPS, incidentally, is not of your standard FS variety, but is a fair representation of a Garmin 530 that will display your FS2002 flight plans, and contains a working Sky Watch TCAS-style collision avoidance system. Another cockpit hot spot provides a cruise or landing view that lowers the front of the panel in order to give you a better view when you need it.

You also get a good selection of liveries to choose from and a Configuration Manager to preset the weight configurations of the passengers and cargo you want to carry, various GPS settings and your position in the cockpit, amongst other things.

As you can probably tell, we were hugely impressed with this package, which really raises the standard for any new aircraft to live up to. Flight One have certainly pulled out all the stops with this one – highly recommended.

Joe Lavery



Step this way please, Sir. If only!



Travel in leather upholstered luxury

Review Score

Publisher: Flight One

Price: £22.99 for the boxed version, \$22.95 (£15.00 approx.) for the download

Websites: www.flight1.com & www.justflight.com

Developer: Flight One

At a glance: To put it simply, absolutely brilliant; undoubtedly one of the benchmarks for future releases.

System Requirements: Pentium II 350MHz, 64Mb RAM, 32Mb 3D graphics card

Recommended: P4 or Athlon 1.5GHz, 256Mb RAM, GeForce3 or 4 graphics card

EZ-Landmark

And if you look to your left, you'll see...



We recognised one of these!

A few months ago, back in Issue 17, we reviewed a wonderfully simple utility from Abacus called EZ-VFR; it was designed to get you easily to any airport within a pre-defined radius, by displaying both the ICAO code and the heading required to fly there. The same company has decided to have another shot at this form of navigation with EZ-Landmark, but this time showing significant buildings and monuments rather than airports. It does a similar job for landmarks around the world, but it has to be said that the UK wouldn't be the best area to serve as an example, unless you rarely fly outside the capital.

It seems that structures such as the Forth rail bridge, both Severn bridges and Edinburgh Castle don't warrant a mention, but let's not be too critical; the most famous landmarks in all the major cities in Europe are included, among them the Coliseum in Rome, the Eiffel Tower, London's ill-fated Millennium Dome, the Brandenburg Gate in Berlin and, moving a bit further afield, the Egyptian pyramids. As well as the more obvious monuments familiar to us from our geography lessons, prominent skyscrapers and buildings in many US cities are identified.

You can define the distance at which headings to these landmarks will appear, from a range of one to thirty nautical miles;

this is useful if you're in an area rich in such structures because the screen can become quite cluttered with text. As with EZ-VFR, the onscreen display provides an identifying name, distance from your current position, and the heading to fly. To make the labels easier to read, you can select one of three density levels of landmarks to be indicated, and also the size of the onscreen display. Just one keystroke is all that's needed to turn EZ-Landmark on and off, so it's simple enough just to activate it if you get curious about what you're seeing.

If you want to redress the omission of certain landmarks, then you only have to slew to the position, make a note of the latitude and longitude co-ordinates, and then add them to the database yourself. This is a little tricky if you're not familiar with database file structures, but Abacus does provide fully detailed instructions if you want to have a go. They have, in fact, promised to supply an Excel-compatible spreadsheet in the very near future to simplify the task. At the time of writing, the landmark database has been updated from just over 1,000 original entries to a staggering 170,000. This further expansion of the database can only serve to improve EZ-Landmark's usefulness.

Joe Lavery



Now you know what they're called!



Anyone fancy labelling the NatWest tower?



Joe's contribution – Cardiff Castle... and his own house



Rumour has it that the Queen added one of these herself

Review Score

Publisher: Abacus
Price: \$19.00 download (£12.00 approx.)
Website: www.abacuspublisher.com
Developer: Abacus

At a glance: Extremely useful for sightseeing VFR pilots, and becoming ever more so as users update their own localities.

System Requirements: PIII 400MHz, 128Mb RAM, 3D graphics card

Recommended: P4 or Athlon 1.5GHz, 256Mb RAM, 64Mb 3D graphics card

Project Airbus A320

A busman's holiday

As flight simulator design tools and standards continue to improve, so too does the work of freeware developers, and distinguishing a freeware add-on from a shareware or commercial program is already becoming increasingly difficult. Not long ago an outfit known as Project Airbus set out to construct top-quality Airbus aircraft for FS2002; today they are among the most respected freeware development teams around.

The PA A320 comes in two variants – the A320-100 and A320-200. Both are modelled in gmax and contain many novel features, some of which you might not expect to see featured in freeware developers' creations. You notice immediately that the shape of the A320 is exceptionally well crafted; Airbus has distinctive nose and wing sections, and these have been captured to a very accurate degree.



Night lighting is among the best we've seen in a VC

One of the main attractions of the PA A320 is the 3D cabin interior, which compares favourably to that of DreamFleet's 737-400. There are no passengers inside, but you can clearly see the seats, seating arrangements and seat covers. The doors are also fully modelled, and the experience of sitting at the gate waiting for the passengers to board is enhanced as the doors actually open to the cabin, not just a small empty box.

Project Airbus has also implemented the two main engine configurations for the A320:

CFM and IAE. Both are well constructed, and differentiating them from the real thing is honestly impossible. Reversers are incorporated, including those on the CFM turbofan, which fan out rather than pull back like those on the IAE – a very nice touch. The undercarriage is equally worthy of note; the cargo bay and doors are fully 3D, accurately modelled and textured. On the ground the gear even flexes to simulate the suspension, and is an impressive sight.

The liveries provided by the Project Airbus team are highly lifelike – crisp and clear, yet with a slightly dirty, used look to them. With this being a freeware model, other painters haven't been slow to create liveries; there are already a huge amount of repaints available on the Internet and the numbers are continually growing. Chances are that if you can't find your preferred paint scheme on the PA website at the moment, you'll find it elsewhere on one of the major FS sites.

Unfortunately the A320 doesn't come with its own 2D panel, but it does have its very own virtual cockpit. It's one of the finest freeware offerings available, and the best feature of an already remarkable package. It's incredibly detailed, and is complete with its own custom gauges for the glass displays. For those of you who fly only using the VC, this is your freeware dream machine. It gets even better at night, when full cockpit lighting is turned on.



Welcome to the flight deck – superb

The flight model is responsive and smooth, thanks no doubt to the input of Lufthansa technicians and real A320 pilots, and gives the responsive feel you'd expect from an electronically controlled aircraft. The lack of an advanced panel with this aircraft means, of course, that there is no autotrim or any similarly sophisticated systems, but you're unlikely to feel you're missing out. The real Airbus fly-by-wire flight control system produces smooth and monitored movements through its integration with the flight computers and, given the technical limitations of FS2002, this difficult feature is impressively modelled.

Overall this A320 is a fantastic aircraft, and a real credit to Project Airbus; an A320 of this quality, for nothing more than the price of a phone call, is an absolute bargain. ■

Eoin Sutton



Awesomely detailed undercarriage

Review Score



Publisher: Project Airbus

Price: Freeware

Website: www.avsim.com/projectairbus

Developer: Project Airbus

At a glance: A quality offering from nose to tail. Very impressive.

System Requirements: Not specified

Recommended: PIII 700MHz+, 256Mb RAM, 32Mb 3D graphics card

Air Shuttle Express

— Brasilia International Airport

Going nuts for Brasil

Brazil may be noted more for its football, coffee beans and carnivals than flight simulation software, but this new product from Real Flight Brazilian Sceneries should change our perceptions and introduce a new developer to the FS world; the Real Flight team intend to do for South America what companies such as Lago and Aerosoft have done for Europe, by providing highly detailed airports, cities and photorealistic textures to elevate the scenery of South America's largest country to the standard we've come to expect from scenery add-ons.

This package provides three major airports: Brasilia International, Santa Genoveva and Anapolis, together with most of the more prominent buildings in and around the city of Brasilia itself. As always, these are best explored from the cockpit of a GA aircraft such as the default Mooney, or perhaps the

Cessna Golden Eagle 421C twin reviewed elsewhere in this issue.

As you pass over the city, approaching the base threshold of runway 29 at Brasilia International, you'll see some of the famous landmarks scattered around the area – the Teatro Nacional Claudio Santoro, for example, the beautiful cathedral designed by Antonia Marianne Peretti, and the Convention Centre flanked by the city's huge sports arena. All these structures have been designed in great detail, with custom textures which obviously took some time to complete. Modelling all the stylised architectural features of a modern city such as Brasilia is in fact quite an achievement in itself.

This same attention to detail is apparent in the airports, of which Brasilia's, known locally as the Airport President Juscelino Kubitschek, is the most impressive. The

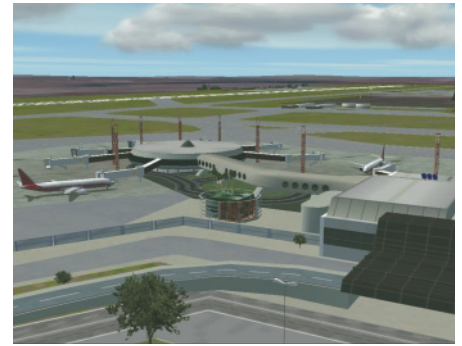
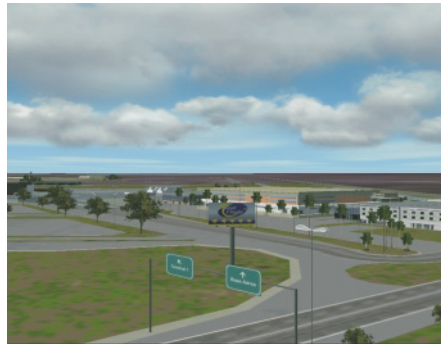


Are you sure these will all fit in there?

authors have really pulled out all the stops in this design, and every road, track, building and fence that exists in the actual airport has been modelled. We took a quick drive around the approach roads and service areas, and noted the traffic signs, trees lining the roads, and even the barrier gates guarding the entrance to the customs



Arriving at the Anapolis municipal airport



Detailing around the perimeter of Brasília International is as good as it is inside the airport

sheds. Once you get airside you'll see that the air bridges and gates are all depicted, but unfortunately are not operational at the moment. The quality of the terminal and ancillary buildings, however, more than makes up for such a minor deficiency.

The other two airports are much smaller, but have been created with an equal level of detail that extends as far as the modelling of petrol pumps in the service station outside the airport. Or if you take a trip to the Aeroclub at Goiania you can have a quick game of pool in the pilot's lounge, before relaxing with a coffee at one of the tables laid out on the sun terrace. The documentation mentions some enhancement to the AI traffic, which wasn't obvious at first, but if you park up and watch you'll find that the local traffic is accurately monitored by ATC. Amusingly, ATC started warning other aircraft of an unruly Cessna parked on the taxiway.

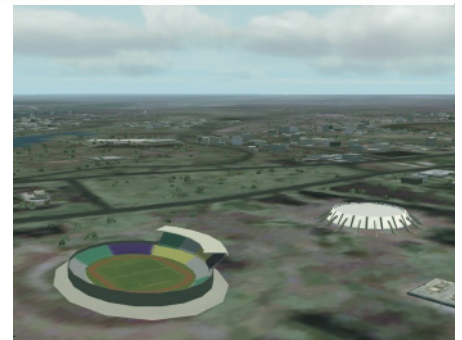
To add interest to the landscape surrounding these airports, the authors have included over 1,800 square miles of photorealistic terrain derived from satellite imagery. This was originally provided at a resolution of ten metres, but has recently been updated with a patch that increases it to four metres. Another patch has just been released which significantly enhances the Autogen scenery around the airports – a good indication of the company's ongoing support for their products.

To give you a flavour of the aircraft that fly in these parts, the developers have included a DC-10-30 painted in the livery of VARIG LOG, the Brazilian logistics company who collaborated with Real Flight on this project. This is a transport aircraft with all the usual

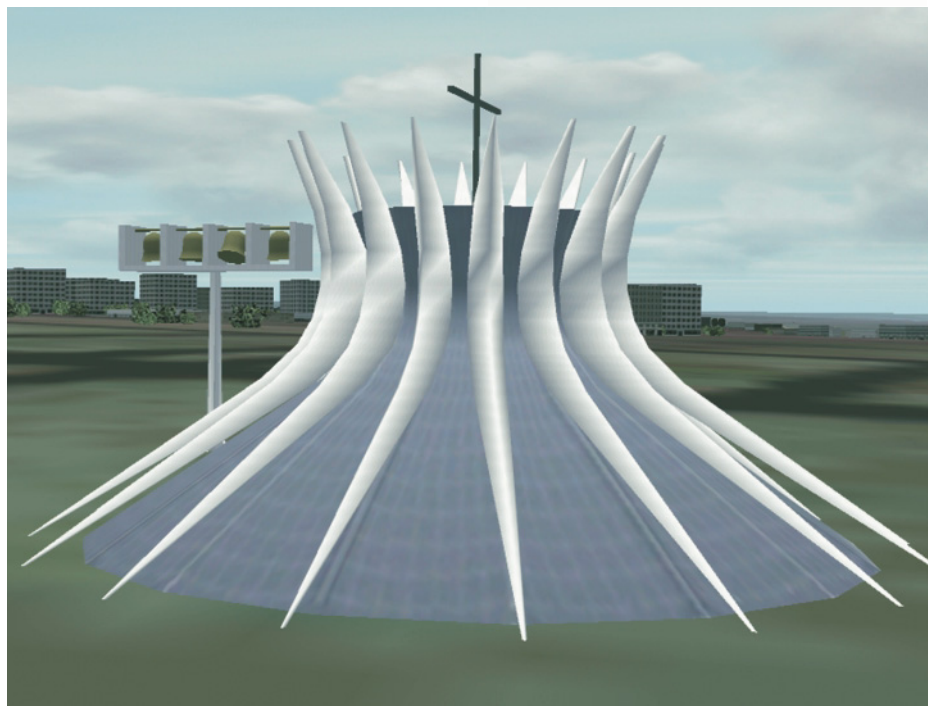
embellishments – rolling wheels, opening cargo door, nicely animated flaps and spoilers, and a custom panel that makes use of the default gauges. Incidentally, if you like the look of this aircraft you can download it from the Real Flight website free of charge.

This first release from Real Flight is an impressive one, and we look forward to seeing the company's next project, which is a rendition of Rio de Janeiro.

Joe Lavery



Essential Brazilian scenery!



Brasília's amazing cathedral



VARIG LOG DC-10 dwarfing the terminal at Santa Genoveva



Put some cash on the table and join the pool team

Review Score

Publisher: Real Flight Brazilian Sceneries

Price: €19.95 (SimMarket price) (£13.00 approx.)

Website: www.realfight.com.br

Developer: Real Flight Brazilian Sceneries

At a glance: An inexpensive package of three detailed airports and some impressive scenery, for a heavily populated but largely ignored area of the world.

System Requirements: PIII 500MHz, 64Mb RAM, 80-700Mb hard drive space, 16Mb graphics card

Recommended: P4 or Athlon 1.5GHz, 256Mb RAM, 64Mb 3D graphics card



Triple Seven, Perfect Flight 2000's Boeing 777 tribute package, consists of 28 new liveries for the default B777-300 fleet, 431 pre-programmed AI/ATC adventures, and 75 Perfect Flight 2000 adventures, as well as stereo sounds and the Triple Seven Manager software interface.

Regular 777 flyers won't be disappointed with the choice of airline liveries available, but much of the paintwork is, regrettably, below average; we actually found it difficult to read some of the smaller writing on the fuselages, even with with Aircraft Texture Size at the highest setting. This is disappointing, especially in view of the quality of much current freeware aircraft art. The sounds do add to the 777 experience, but it's a shame there's no panel to compare with the developers' earlier 747-200 release.

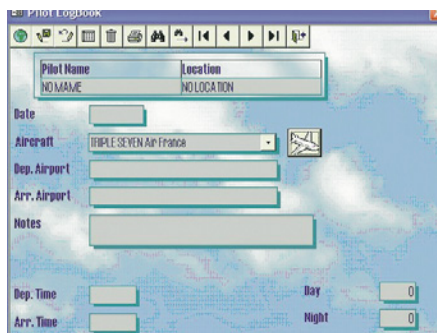
The 431 pre-programmed flights which use the default FS2002 ATC will complement any 777 flyer's flight plan library; the flight plan has already been created, the gate has been chosen, and everything that can be done within FS2002 has been completed. These flights are mainly of the long-haul variety, and are all those which would realistically be flown by such a large airliner.



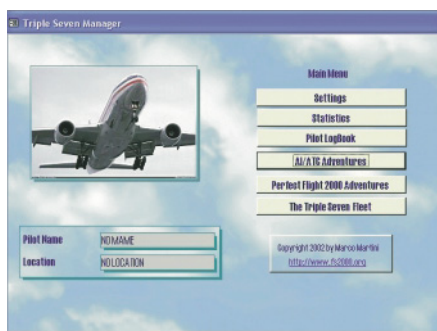
Paint schemes are numerous, but could be better

The Perfect Flight 2000 adventures utilise the somewhat limited APLC 32 compiler. They do, however, cover a range of airports worldwide, provide a full ATC service from start-up to shutdown, and include a random weather generator, checklists, SIDs and STARs. Additions to the FS2002 ATC include the chance to select different transition

levels and cruising altitudes, and some novel inclusions such as 'auto take-off' and a co-pilot, which are simple to access. The only ATC voice has a British accent, and it's a shame that no others were included, considering the diversity of destinations on offer. The frequencies are random and it's not possible to change your call sign for the flight.



The logbook is a useful inclusion



Triple Seven Manager – simple to use

Flying the adventures can be tricky; the ATC sometimes 'sticks' after a certain word, and in several of the flights we found ourselves flying in circles around the departure airfield under co-pilot control – ATC instructions must be followed to the letter! You can ask to continue on to the next waypoint, but can't escape the feeling that these adventures have not all been tested thoroughly. Background chatter is supplied by a combination of real-world chatter and what seems to be from the old FS98 adventures, but this does work well, and many of the flights are interesting and enjoyable. The all-important sense of immersion is achieved, and numerous



At the gate, ready for another long haul

advantages to the FS2002 ATC make these flights worthwhile, but the somewhat bugged code and lack of extra voices let the package down.

The Triple Seven Manager software is a pilot logging facility which runs under Microsoft's Access database program; it allows you not only to log your flights, but also to keep track of which adventures you have flown, access the Perfect Flight flight plans and view the entire 777 fleet. It's easy to use, and is a useful reference guide to monitor your progress with the package.

What's regrettable about Triple Seven is that it could have been so much more. With a little more effort put into it and a different price tag, it would be altogether more appealing, but if you're after some simple 777 flights to enjoy, Triple Seven might just be what you're looking for.

Eoin Sutton

Review Score

Publisher: Perfect Flight 2000 Project

Price: €24.00 (£15.00 approx.)

Website: www.fs2000.org

Developer: Marco Martini and Perfect Flight 2000 Project

At a glance: Low-quality liveries and some bugs detract from limited but enjoyable adventures. This, and the price, might well deter many.

System Requirements: As for FS2002. 220Mb free disk space, and the Manager needs Access 2000 or a more recent version.

Recommended: P4 or Athlon 1.5GHz, 256Mb RAM, 32Mb 3D graphics card

WORLD AIRLINERS

*The world's favourite airliners take to the skies
in a new edition for Flight Simulator 2002*



747-400 & 777-200 PROFESSIONAL



If you're serious about flying the heavy metal and demand the best that's available, then these two famous airliners are sure to be at the top of your most-wanted list. When 777-200 and 747-400 Professional took to the virtual skies they were hailed as the last word in simulated aircraft development. Now they've been re-developed for Flight Simulator 2002 and brought together in a fabulous double pack, it's clear that they're still the leaders of the airliner pack. The combination of award-winning detail, accurate systems, authentic liveries and lifelike features puts these two airliners in a class of their own.

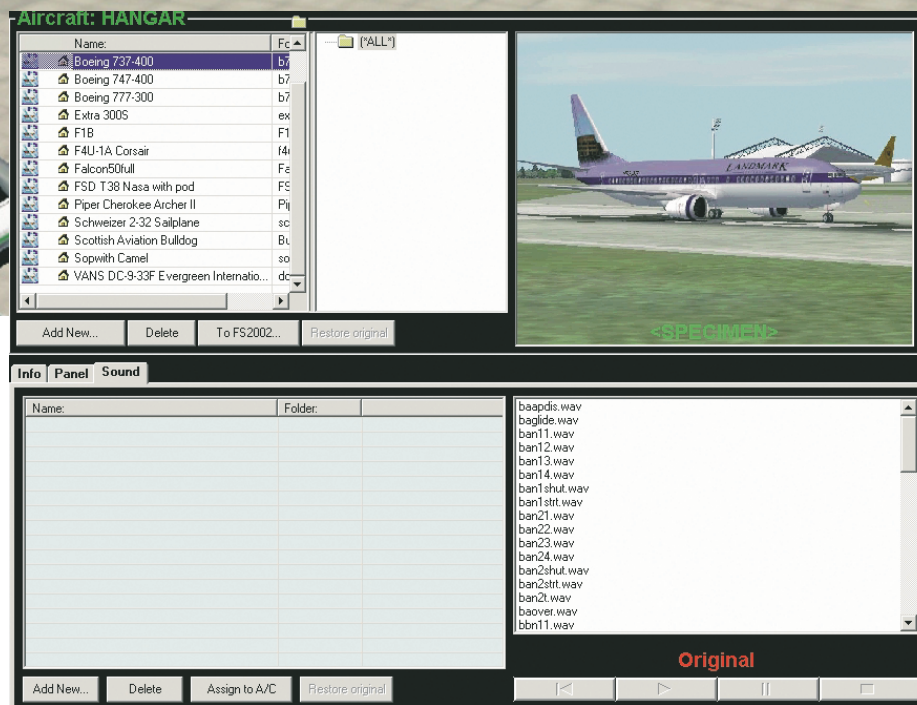
Just Flight

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Units A2/A3 Edison Road, St. Ives, Cambridgeshire, PE27 3LD, United Kingdom • Telephone: +44 (0)1480 462748 mail@justflight.com

FS Addon Manager

Tidy up that FS directory



Regular PC Pilot readers, or those who browse the numerous flight simulator websites, will be in no doubt that there's a tremendous pool of high-quality add-ons available for anyone who cares to download them. Unfortunately, getting the best out of these freebies requires a certain degree of knowledge of the workings of Flight Simulator's file structures and, of course, an understanding of file compression programs such as WinZip. In fact, the number of letters we receive on this subject indicates that a lack of this knowledge results in many simmers being reluctant to use these files. No doubt this was instrumental in prompting Manfred Murer to write his FS Addon Manager utility.

It's a standalone program that will accept virtually any add-on and insert it correctly, within certain limits, into Flight Simulator, while keeping a record of the new file in case you want to remove or archive it at a later date. The program is basically split into four segments, covering aircraft, scenery, AI traffic, and the hangar where aircraft are kept when not required in FS2002. The idea is that you don't want to burden FS2002 with lots of aircraft and scenery that are not actually being used, because all these unused elements will eventually degrade the sim's performance.

Import bitmaps and listen to sounds from within the program

Our own PC Pilot FS directory has to be flushed out quite frequently to stop our flying from grinding to a complete halt, due to the sheer volume of files we evaluate for our Downloads section, but this straightforward method of clearing out unwanted aircraft or scenery unfortunately doesn't remove any of the redundant gauges or textures. FS Addon Manager is therefore invaluable, unless you're happy to reinstall FS2002 on a regular basis in an effort to keep it running smoothly.

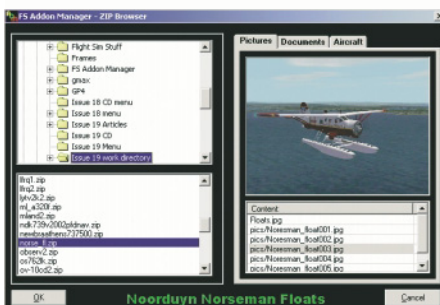
The program is straightforward to use; simply install the downloaded file in its zipped form, and the Addon Manager will add it to the hangar directory. You can elect to install it

into FS2002 at the same time, and can also attach a screenshot of the item as well. A Zip browser even allows you to investigate the contents of the compressed Zip file before you actually install it.

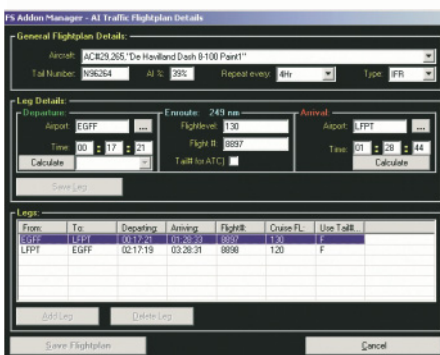
In the case of aircraft, you can chop and change panels and sound files, and even import new panels on their own. The author has also added a file viewer and sound player so you can check out individual files without leaving the program. You can even repackage (zip) an aircraft and e-mail it directly to a friend, again from within the program. If you're on the receiving end of an e-mailed Zip file, one click will install it straight into your own simulator.



So many to choose from...



Hmmm. The red one or...



Live up your FS world with the AI Traffic Manager

The interface is laid out logically, and tabs at the top of each window provide a wealth of information about each file. The lower left-hand window, for example, shows the currently selected aircraft information, and the assigned panel and sound set. If you select these tabs, the right-hand window displays the aircraft's title, ATC ID, User Information, Description and Performance data. In addition, it will display (and grab) screenshots of aircraft and panels that can be enlarged to full screen with a single mouse click.

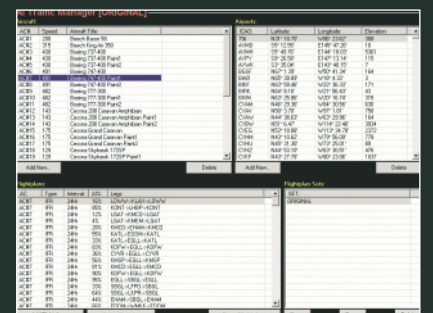
Another option allows you to manage your flight plans and AI aircraft, with the ability to provide new ones for airfields that don't have them, and using your own aircraft if you prefer. Naturally, you can edit the existing plans to better reflect real-world scenarios at airports you're familiar with. We all know that the AI aircraft in FS2002 are rather sparse when compared to the traffic at real airports, and this utility gives you the opportunity to make simulation more like reality. Don't forget, though, that adding a few dozen AI aircraft is going to make quite an impact on those frame rates.

Although the Addon Manager is a massive improvement on trying to install files on your own, there are still a few occasions when you'll have to get your hands dirty. Some authors package Zip files within other Zips, for example, and sometimes they might get the location or file structures wrong within the Zip file itself; they might provide a custom installer to do the job for you, in which case the program will inform you that there's a custom installer, but it can't possibly identify when the files are zipped in a non-standard way. You can, however, still include them in the Addon Manager library after you've manually installed them.

Much to our delight, we found that in the majority of cases the program understands where each file should belong, and simply puts it there. FS Addon Manager should tempt plenty of previously wary folks into trying out some of the superb freeware available – much of it really is too good to miss out on, and now there's no excuse. The price of this handy utility even includes free lifetime upgrades.

Joe Lavery

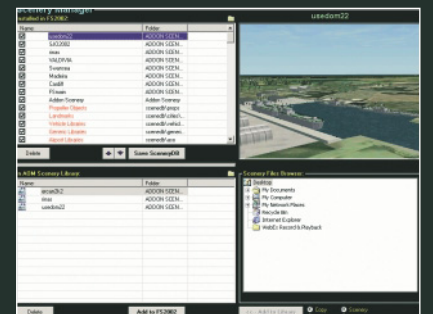
The four main utility screens



AI traffic manager



Aircraft hangar



Scenery manager



The aircraft you have installed

Review Score



Publisher: Manfred Murer

Price: \$19.90 (£13.00 approx.) download

Website: <http://fsaom.buddysare.org/>

Developer: Manfred Murer

At a glance: If you're nervous about installing all those free goodies from the Net (or from our cover CD), then let FS Addon Manager take the strain for you.

System Requirements: Pentium III 350MHz, 64Mb RAM, 3D graphics card

Recommended: P4 or Athlon 1.5GHz, 256Mb RAM, 32Mb GeForce or similar graphics card

Online Combat



World Wide War!

So you've cut your teeth on the latest dogfighting simulation and think that you could teach the Red Baron a trick or two. But what next? Wait for another add-on, create your own missions, or hang on another six months for the Next Big Thing? Or how about hitting that Multiplayer button to take on some real opponents over the Internet to see how good you really are. Here's the lowdown on why, when and where you can shake your tail feather and toast someone else's...

The Internet revolution having well and truly arrived, there's no excuse for not going online to reap the benefits of aircraft, scenery and missions that can be downloaded for the price of a phone call. With modems costing less than a tenner, and Internet Service Providers beside themselves to offer free dial-up connections, it's no surprise that online gaming is taking off with afterburners fully lit. But why should you venture online if you're perfectly happy slugging it out with your PC's processor?

Well, for the same reason that most people prefer going head-to-head with their friends in a game of bridge or poker instead of sitting alone playing solitaire; on the Net you can literally challenge somebody on the other side of the globe to a duel. The thrill of pitting yourself against friend or foe to see who's the best of the best is what this is all about – and the bragging rights that come with it, of course. The opportunities are plentiful, from private one-on-one dogfights to full-blown World War campaigns involving thousands of other players online simultaneously.

Mainstream boxed sims such as Combat Flight Simulator 2, IL-2 Sturmovik and Comanche 4 all have excellent multiplayer support, and are a great way of taking your first steps into the online world. The most common encounter is all against all, meaning survival of the fittest, where the winner is the one who notches up the most



There's plenty of sneaking around to be done online

kills. This generally turns into a complete furball, and pushes even the most experienced pilot to the limit. You soon find that checking your six takes priority over getting your guns on target; one second you're all lined up for a kill, and the next it's you who becomes the hunted. In your first online session don't worry if you end up

being shredded more than a few times; it's a thrilling experience to realise that every other pilot is a real person too. Once your adrenaline starts pumping you'll just want to dive in and regain your dignity with a few more sorties. And that's it – now you're hooked, and flying against the computer just won't be the same again.



Tempers get frayed in Aces High!

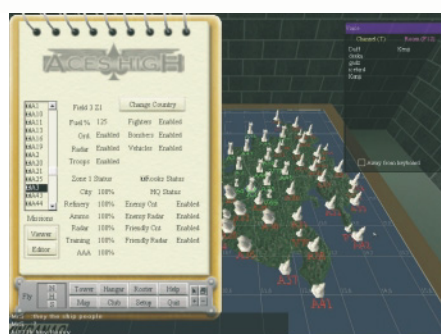
Take me to your server

That all might sound very exciting, but where do you find all these other online aces? Most of the latest flight sims have fairly simple multiplayer options that direct you to a portal where you can do battle with other like-minded pilots. Chopper fans, for example, can go online with Comanche 4 via the NovaWorld gaming portal; this runs completely within the game interface, making it extremely easy to use.

In CFS2 you just hit the Multiplayer button and then press 'Play it on the Zone' to be taken to the MSN Gaming Zone website. As with most gaming portals, you need a username and a password to play, and in this case these take the form of a Microsoft Passport account. If you have a Hotmail or MSN account then you already have one; otherwise you can register for free on the Zone website. Once you've logged in with your account details and chosen a call sign, there's a host of online games on offer, including the original Combat Flight Simulator, as well as FS2002 and other non-FS titles.

Navigate to the CFS2 page and you'll find the option of different arenas for different users. Broadband or network users with fast connections can enjoy their own separate area, and others are reserved for special events organised by the Zone staff. For normal modem users the main Midway page shows, in the form of icons, a list of all the games available, from novice open-to-all dogfights, to private one-on-one duels that are password protected. You can host your own games with a few mouse clicks, setting your own difficulty levels and password protection if you only want your friends to join in.

For each game you are shown who has already joined, and also a small meter



Fly for one of three countries in Aces High

indicating the ping times for each player; this gives you some idea of whether you are likely to experience problems as a result of your opponents being on the other side of the world or having a slow connection. During play, poor ping times can manifest themselves in many ways – stuttering graphics, ghosting (where another plane appears in several places at once), and jumping, where other planes move in fits and starts and are impossible to hit. These effects range from being slightly annoying to completely ruining the experience, so it's best to pick a sim where most of the players' ping meters are showing green lights. At the bottom of the screen is a chat window so you can communicate instantly with other people via typed single-line messages. Once you join a game, CFS2 launches and any necessary mission information will be downloaded to your PC. Then it's chocks away and straight into the thick of the action against your new friends – and enemies!

While CFS2 is limited to eight players online, IL-2 pilots can enjoy 32-way dogfights over the Eastern Front using the Ubi.com portal software that is included with the CD. There are, however,

Code breakers

ADSL: Protocol for allowing simultaneous high-speed computer data traffic and voice to co-exist. It stands for Asynchronous Digital Subscriber Line (asynchronous because download speeds (typically 512 kbits/s) are higher than upload speeds (typically 256 kbits/s)).

Broadband: High-speed Internet connection using a normal telephone or cable telephone/TV line into your home. Broadband is also available via a satellite dish.

Client: Desktop computer, usually your PC, that connects to a server.

Co-operative Multiplayer: Playing as part of a team with other players, sometimes as different crew in the same aircraft.

ISP: Internet Service Provider, or the company that provides your Internet connection. The term includes ADSL broadband service providers.

LAN: Local area network. A high-speed network normally used in offices, but which can be installed in the home.

Online Arena: An area where gamers can compete against each other in a specific game. Also an area where a specific mission takes place.

Ping: Command for finding the time taken to send a message from one computer to another across the Internet. High ping times can cause jerky gameplay or the appearance of ghost planes.

Server: A central computer to which client PCs can connect. Servers act to centrally co-ordinate the action.

TCP/IP: Transport Control Protocol/Internet Protocol. The networking standard used on the Internet for communication between computers.

Health Warning – Online flying is addictive!

Remember to keep track of your dial-up calls and bills; the hours can fly by when you're embroiled online. Many 'all-inclusive' BT call packages only include calls of up to one hour, after which you must disconnect and then reconnect, or face paying normal call charges for every minute after the first hour. Broadband really is worth considering, but do remember when working out your budget that you'll still need to pay phone line rental for your voice calls if you go ADSL.

Turbocharge the web

You've seen the adverts and heard the hype, but what does broadband Internet really mean for you? In a nutshell, you'll have a connection that is ten times faster and open 24 hours a day, but which won't hog the telephone line. It's been a long time coming, but prices have come down to a realistic level for mere mortals, and ADSL is now seriously worth considering if you spend a lot of time online. All this can be yours for just £20.00 a month, although there are a few caveats...

The cheapest and fastest way to broadband nirvana is with a DIY installation kit, or wires-only subscription. You typically have to pay £65-85.00 in the UK to have your telephone line ADSL-enabled at the exchange, and then you need the right hardware for your PC. Your ISP may offer a starter kit for around £80.00, which includes an ADSL modem and a couple of micro-filters; these little adaptors split your telephone signal into voice signals and high-frequency computer warble. This allows you to use your modem while simultaneously chatting over the phone, making it a good alternative to a separate phone line. Just install the modem drivers and/or ISP software and you're away. While modems are the popular choice, you might want to consider buying a network router that will allow you to share your ADSL connection with other PCs, laptops and palmtops, although one of these will set you back around £150.00.

That's the theory, anyway. In practice, problems can occur, and these start before you even order. For you to take advantage of ADSL, your local telephone exchange must have been upgraded for this new service. BT has been doing this across the country but UK coverage is far from being 100%. Not only that, but you also have to be within 5km of your local exchange. If you aren't, then it's tough luck, although you may be able to get a cable connection from providers such as NTL and Telewest. Potential users in rural areas may have to petition BT, as they will only put in the equipment if they consider that there is enough demand at the more remote exchanges. Also, due to the huge take-up of broadband, some ISPs' technical support centres have gone into meltdown once they became unable to cope with the volume of calls. Things seem to have settled down now, though, and most companies provide a thoroughly decent service.

So, is it worth it? If you spend a lot of time online, are thinking about getting a second telephone line, or are just fed up with the World Wide Wait, then broadband is the answer to your prayers. Say goodbye to poor ping times and long mission downloads and welcome the Brave New World. For all the latest information, including comparisons of broadband ISPs, head straight to www.adslguide.org.uk.



Translucent gauges in *Fighter Ace III* are a great idea



Where did she come from? (*Fighter Ace III*)



Plenty of combat choices in *Fighter Ace III*

alternatives to the bundled multiplayer options, in the form of gaming services; two of the most popular among flight simmers are HyperLobby and GameSpy. The former was built by users of Jane's Combat Net, and includes support for WWII Fighters, CFS2 and now IL-2. GameSpy is a more commercial product, but is available free in an advert-driven version and supports a plethora of games as well as flight sims. GameSpy scans your hard drive to see which sims you've installed and then adds them to the list on the left-hand side of the screen; clicking on a game icon pulls up a list of available online missions. Both

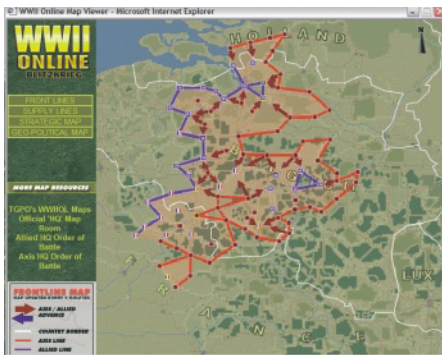
HyperLobby and GameSpy are popular among simmers, particularly IL-2 users, and there are usually well over 400 people online on each service, all of whom are ready to take your scalp in a dogfight.

More, more, more

If slugging it out with 32 players isn't enough, or if you fancy something more diverse, then there is an increasing number of purely online, massively multiplayer games to get your teeth into. These can involve anything from 40 to 4,000 players and aren't limited to plain old dogfights. Warbirds, *Fighter Ace III* and *Aces High* are the three main online sims, and all offer different online experiences, as you'll see in the listings further on.

One thing they have in common is that they are all subscription services which require a monthly fee – from \$9.99 (£7.00 approx.) to \$24.99 (£17.00 approx.) – although some allow a free trial period or offline mode so that you can try before you buy. One downside of these dedicated online sims is that they can require a huge initial download, but you can usually have this sent to you on a CD for a nominal postage and packing fee. It's easiest to pay for subscription services by credit card or direct debit via a secure shopping web server – make sure there's a small padlock in the bottom right corner of your browser – although some also allow you to pay using cash, cheque or other methods. Paying subscriptions monthly means you can cancel at short notice, but there are discounts to be had for those willing to fork out for six months or a year up front; check the individual websites for details.

Why would you want to pay a monthly fee when you can dogfight for free using your



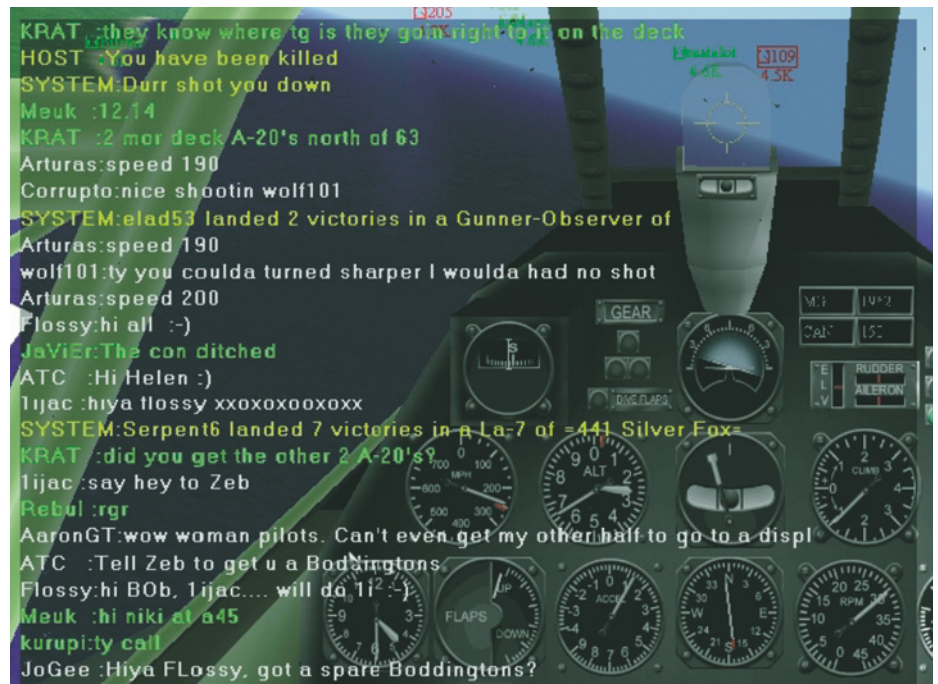
Good maps are necessary to keep up with the action in WWI Online

favourite boxed sim? These subscription-based online sims sell themselves on being able to provide more of a community feel than the average game portal. There are tutorial schemes for beginners in which an experienced pilot will show you the ropes, so that you don't spend all your time riding the silk back to Earth. Your pilot persona can be developed over many weeks and there are often special events laid on, such as races, tournaments and historical missions, in which you can participate.

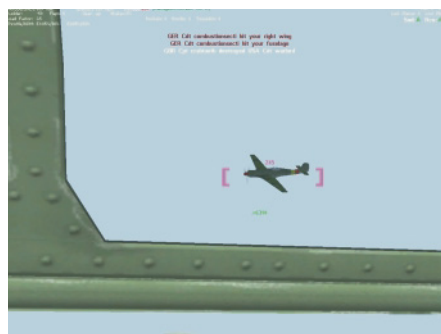
Co-operative missions and team events are particularly entertaining, because you work with your fellow pilots to overcome the enemy. The use of radio text chat is the most common form of communication; channels are global, team-based or user-selectable so that you can limit comms to your immediate squad. This is sometimes necessary when there are hundreds of aircraft in the sky, all flying different sorties and trying to co-ordinate their actions.

An amazing technology that is currently taking off is two-way voice communications. If you have a new-ish sound card then it can probably cope with full duplex sound, so you can use a microphone or headset to talk to other players, using software such as Roger Wilco (check which software is supported). This raises the bar in terms of realism; cries for help mingling with the roar of your engine and the rattle of cannon fire make for a magnificent online experience. The quality of the sound can be variable, though, depending on your connection, although garbled radio messages do add a certain authenticity to the proceedings.

With this level of interaction, friendships are soon formed; this is positively encouraged and you might want to join one of the hundreds of online squadrons or even form your own. After all, you want a wingman you can trust. These units, which usually run their own websites, act as focal points around which like-minded pilots can organise their online activities. Members often paint their aircraft with their own squadron markings and have forums where you can just hang out between sorties and plan future campaigns.



Radio silence is a rarity!



Keep your eye on the enemy or you'll soon be toasted

Squads tend to be geographically based and there are plenty in the UK for all the major sims. This helps to overcome one of the problems of online gaming – time zones. Typically, peak times for online games are evenings and weekends but, with players from all over the globe taking part, the number of players online can vary considerably. The upshot of this is that much of the time you are actually going to be meeting up with people who are in your own time zone, which helps to reinforce the online community spirit. The downside for European pilots is that American online sims naturally run their competitions and special events on US time.

Your country needs YOU

The future of online sims – the persistent battlefield – is already here in the form of WWI Online. Here the war is being fought in real time by thousands of online gamers from around the world. You have the choice of flying any number of British, French or German aircraft, taking a tank into action, or mixing it on the ground with nothing but your trusty rifle. Where WWIOL stands out is in the quality of the gameplay and the



Gotcha!

fidelity of its modelling. The battlefield is truly immersive; when you are first dumped into the action the experience can be genuinely scary, as bullets fly all around you and the not-so-distant sound of tank tracks or enemy aircraft looms. WWIOL is a truly ground-breaking environment, and we can only hope that more games of this type evolve.

While 400 IL-2 pilots on GameSpy sounds impressive, imagine getting involved with the thousands of first-person shooter fans out there for even more spectacular action. Maybe this is a dream too far but, with broadband Britain slowly becoming a reality, it looks like it's only a matter of time before games like WWIOL become the norm as simmers look for that magical extra ingredient to keep the challenges coming. The future of aerial combat is with players who possess real, not artificial, intelligence, so try expanding your combat horizons and take a look at what's available. We'll look forward to seeing you online, but keep checking your six – it might just be us gunning you down!

Kenji Takeda

Dial up for a dogfight

Can I phone a foe?

Warbirds III (www.totalsims.com)



Sim supported: Warbirds

Requirements: Free software download (137 Mb) or order the CD for \$9.99 (£6.50 approx.)

Cost: \$9.99 or \$14.99 (£6.50 or £10.00 approx.) per month for unlimited dogfighting in the Air Combat Arena, and extra for other arenas. \$24.99 (£16.50 approx.) per month unlimited access. (Subscription to Warbirds also includes Dawn of Aces.)

Typical number of online players: 60

Pros: The original online flight sim has a great supporting community, and there are numerous events and battles in addition to the usual dogfighting melées. The latest version also includes ground forces, and more complex scenarios provide a full-blown battle experience. The flight models are lively and feel as realistic as any we've come across. The main battle arena is populated by a reasonable number of players, but getting to the action can be a little slow at times.

Cons: While the graphics are sharp, they are starting to look a little dated. Warbirds III offers plenty of scope for hardcore simmers, but for novices and casual online pilots the action may not come thick and fast enough. This is one of the most expensive online sims, although it does include access to Dawn of Aces. During evening periods in the UK there aren't too many players online, so you'll have to be up well into the early hours to make the most of your subscription.



The original and, according to many, still the best – Warbirds III is a hardcore pilot's dream.

Dawn of Aces (www.totalsims.com)



Sim supported: Dawn of Aces

Requirements: Free software download (17Mb) or order the CD for \$9.99 (£6.50 approx.)

Cost: As for Warbirds III, which is also included in a subscription to Dawn of Aces.

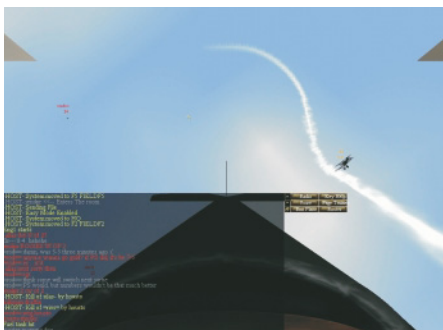
Typical number of online players: 20

Pros: The only online WWI offering with any credibility. The action really is close up and personal, with aircraft that are as much of a handful as you'd expect. The in-cockpit graphics give you a good feel for the restricted visibility that made WWI dogfighting so challenging, and the community feel is enhanced by the relatively small number of regulars.

Cons: Not everyone's cup of tea, and the arenas are sparsely populated. The game engine is the same as that used in Warbirds III, so the looks of the terrain and enemy aircraft graphics lack texture.



Ah, the good old days! When men were men and pilots flew cloth aeroplanes



Keep an eye on your tail!

Fighter Ace III (http://fighterace.vr1.com)



Sim supported: Fighter Ace III

Requirements: Free software download (100 Mb) or order the CD for \$5.00 (£3.00 approx.), plus an extra \$2.00 for postage to the UK and Canada)

Cost: \$9.95 (£6.50 approx.) per month or \$49.95 (£33.00 approx.) for six months.

Typical number of online players: 250

Pros: Fighter Ace was the original WWII combat arena on Microsoft's Gaming Zone and is now run as a separate service by the creator, VR1. It's very easy to use, and is certainly the most visually pleasing online sim around. It has a great full-screen view, with translucent instruments, which provides a great feeling of spatial awareness; this is just as well as the action is relentless. The dogfighting arenas include all-against-all and team games, and full combat games are available for players on both intermediate and advanced levels. You can also set up your own private games. For the monthly fee, Fighter Ace III has it all for the online dogfight junkie.

Cons: Requires a chunky download with no free trial period, although the monthly fee means it's cheap enough to give it a try. Purists may prefer other sims, as the advanced arenas are certainly less popular here than they are elsewhere.



Oh no, not again!

Aces High (www.flyaceshigh.com)



Sim supported: Aces High

Requirements: Free software download (33 Mb)

Cost: 14-day free trial period, and then \$14.95 (£10.00 approx.) per month. Free for 8-person head-to-head mode.

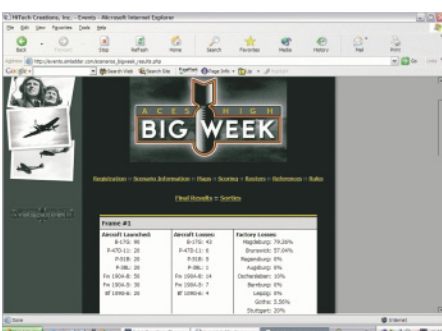
Typical number of online players: 300

Pros: Aces High is a brave attempt to oust Warbirds and Fighter Ace from their established positions. It features some excellent flight models and a fine selection of aircraft, as well as multi-crew bomber action. The campaigns are well organised, with three countries battling it out to gain territory over key targets such as airfields. Roger Wilco voice communication is supported, and adjustable views contribute to an experience which is generally excellent.

Cons: The monthly subscription is among the more expensive, but a lot less than it used to be, so enjoy the free trial on the cover CD to see if it appeals to you. The graphics are a little crunchy, although this is unlikely to worry you too much when the bullets start flying.



Fly from the sea in Aces High



Take part in organised events such as historical missions or special tournaments

WWII Online (www.wwiionline.com)



Sim supported: WWII Online

Requirements: Free software download (110Mb)

Cost: \$19.99 (£13.00 approx.) for download or buy the boxed copy, which is not currently available in the UK. First 30 days of the subscription are free, and then \$9.99 (£6.50 approx.) per month.

Typical number of online players: 4,000 plus

Pros: A new breed of truly massive multiplayer games. Fight on the ground as an infantryman, tank commander or AA gunner, or take to the skies in a Spitfire to support your pals in the bunkers. The flight models are realistically twitchy and will provide a challenge to all but the most experienced of pilots. The feelings of camaraderie and sheer terror as the battle rages all around you are stunning.

Cons: The initial release was plagued with technical problems. While the latest release is better, it needs tweaking to achieve acceptable performance; load times can be long, and the effects of network latency can lead to some very jerky action. You really need a high-speed machine and fast connection to experience WWIOL in its full glory. Most of the action is ground-based, so the number of online aviators is limited in comparison with more dedicated online flight sims.



Dive bomb the ground troops in WWII Online, or try your aim from the ground



Join up with thousands of others on the battlefields of WWI

NovaWorld (www.novaworld.com)



Sims supported: Comanche 3 & 4, F-16, MiG-29 Fulcrum, F-22 Lightning 3 and F-22 Raptor

Requirements: Software for any of the supported sims

Cost: Free

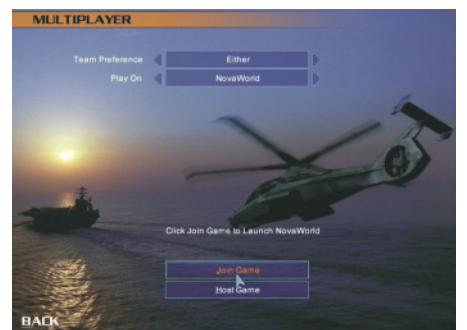
Typical number of online players: 120 (16 for Comanche 3 & 4)

Pros: Simple to use and well integrated with the simulation software, this is ideal for beginners, and is free. NovaWorld also supports first-person shooter titles such as Delta Force Land Warrior – great for those who want some rifle action. The facility to set up private games is included, as well as voice-over-Net communications support.

Cons: A limited number of players in Comanche 4, and the Internet Battle System (IBS) can be rather empty. The IBS titles are really showing their age now, although they're still good fun and ideal for older PCs. Comanche 4 gameplay tends to be arcade-like, but certainly gets the adrenalin going.



Fast and furious, Comanche 4 online has an arcade-style flavour to it



NovaWorld's in-game browser interface makes it a doddle to use

MSN Gaming Zone (<http://zone.msn.com>)



Sims supported: Combat Flight Simulator, CFS2 and FS2002

Requirements: Software for any of the supported sims, and a Hotmail or Microsoft Passport account – register free on the Zone website.

Cost: Free

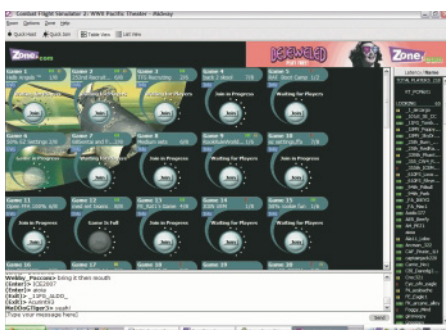
Typical number of online players: 500

Pros: Easy to set up and use, only requiring a small downloadable program to be run. A 'Buddies' system allows you to keep track of your friends and chat when they log on. Private games can be password protected, and there are usually enough people around to let you find a good scrap. Ping times are shown for each player, making it easy to avoid joining battles that could suffer from poor connectivity.

Cons: Limited to Microsoft titles at the moment, and games only support up to eight players.



Ojisan-Rock strikes again



Pick a game, any game – but make sure the ping lights are all green

HyperLobby (<http://hyperfighter.jinak.cz>)



Sims supported: IL-2, CFS, CFS2, WWII Fighters, European Air War and others

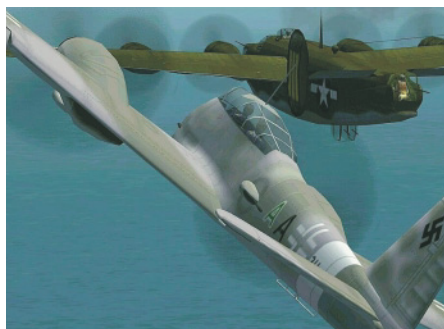
Requirements: Software for any of the supported sims and the HyperLobby software (available as a free download)

Cost: Free

Typical number of online players: 450

Pros: A popular, and free, portal with many different arenas in which to participate. Communication options are good and very easy to use, and ping meters are included to help you choose a smooth game.

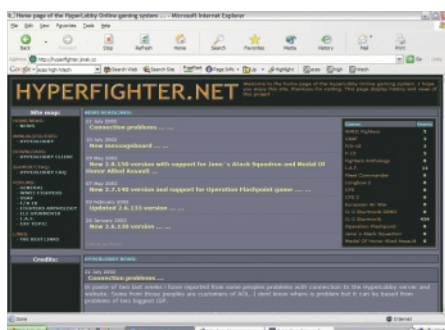
Cons: One person seems overly worried about potential PC security issues, but we experienced no problems. Most of the action is limited to the IL-2 arenas.



Fighting off a 410 in the HyperLobby



IL-2 is flavour of the month on gaming portals worldwide, including HyperLobby



The IL-2 hunting grounds are numerous at the HyperLobby

GameSpy (www.gamespy.com)



Sims supported: Combat Flight Simulator (but not CFS2!), IL-2, MiG Alley and many Jane's titles

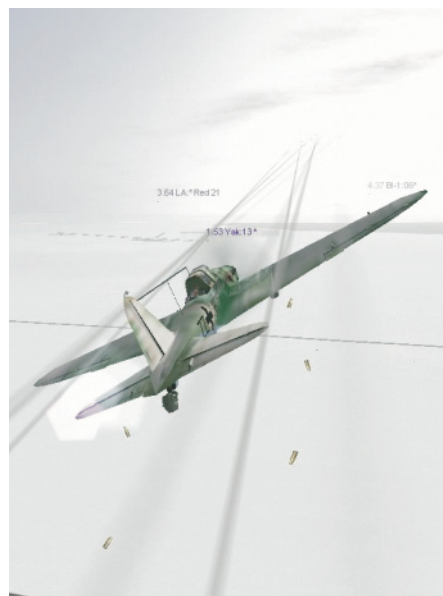
Requirements: Software for any of the supported sims, and the GameSpy client software (2Mb download)

Cost: Free basic service. \$20.00 (£13.00 approx.) registration free for advertisement-free service with extra features.

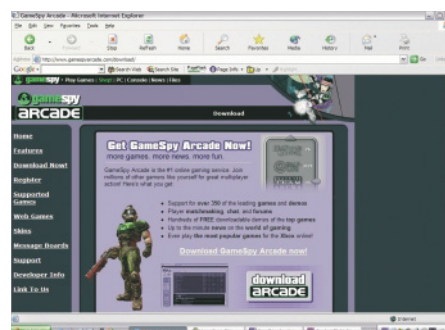
Typical number of online players: 200

Pros: A very slick and easy-to-use system that is a breeze to install. Support for just about any game, and the basic version is free. There's plenty of action to be had, and ping meters are there to help you choose the fastest games.

Cons: IL-2 is the sim of the moment here, but it's the same on other portals. Advertisements may be annoying, but you can pay to get rid of them and at the same time pick up many additional features for keeping track of your friends online.



Into the fray once more



A professional interface, and numerous titles are supported

All new campaign for IL★2 Sturmovik with 100s of missions!

✚ Operation Barbarossa

MISSION AND CAMPAIGN EXPANSION FOR IL★2 - STURMOVIK



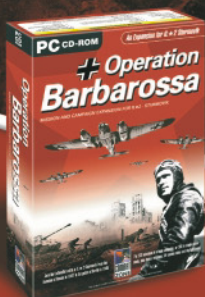
Tackle the enemy head to head in the air or mount ground-attacks against authentic targets in multiplayer mode for online flyers

Choose to fly the campaign in an Me 109 or Fw 190 with over 60 custom aircraft repaints included for flying in co-op mode

Fly 390 missions from the campaign in single-player mode.

You can also take part in an extra 28 Luftwaffe or 34 Russian VVD missions, plus there's another 20 available in multiplayer mode for online flyers

At 04.15am on 22nd June 1941 German bombers attacked Soviet airfields with devastating effect and the invasion of Russia, codenamed Operation Barbarossa, had begun. After four years of bitter fighting that included infamous battles like Kursk and Stalingrad, the Russians arrived at Berlin. Now you can join the Luftwaffe in this gruelling campaign and take part in 230 historically accurate missions that take you from the heady victories in the Kuban Peninsula, through the bitter winters and finally to fight for your very existence at the gates of your capital.



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Aircraft Icing

Are you treading on thin ice when you fly in clouds?

According to an old saying, if you put a frog into hot water it will immediately leap out, but if you put it into cold water and slowly heat it up, the frog never jumps out. What's this got to do with flight simulation? Well, this is a direct parallel with how some aircraft icing causes crashes. It can slowly build up, unnoticed, until it's too late to do anything sensible about it...



You need to be properly equipped if you are deliberately flying into conditions where icing is likely

Not all icing is like this. Some should be spotted and removed before the plane even leaves the ground; other forms of ice can build up extremely quickly during flight. However the ice is formed, it can be a significant threat to the safety of your flight. PC-based simulators now include an option for icing in their weather settings and, if you want your pilot's skills to be complete, it's something you really should know about. While ice is generally something pilots choose to avoid, flying into icing conditions in the modern world of aviation is inevitable if flight schedules are to be kept.

How a plane is affected by ice

When people think of aircraft icing, they automatically think about ice building up on the aeroplane's wings. This has several effects; because the ice forms predominantly on the leading edge of the wing, it alters the shape from that of a designed aerofoil to one approaching a plank of wood. Consequently the aerodynamic lift produced by the wing reduces, and the drag increases. At the same time, as the ice gets thicker, it adds more and more weight to the aircraft, which in turn means that more lift is needed.

In extreme cases the ice can cover the whole wing, including the ailerons and flaps. If the ice is thick enough, the control surfaces can be literally frozen in position,

making the plane impossible to fly. Ice can build up on any of the aeroplane's surfaces, not just the wings, but icing is usually most severe on forward-facing parts, such as the leading edges of wings, the tailplane, rudder, struts and propellers.

While icing of the flying surfaces and propeller are dangerous enough, carburettor icing is equally perilous, and can happen on any aircraft powered by a petrol engine with a carburettor. The carburettor mixes fuel with the air going into the engine, and is particularly prone to ice forming inside it. If this grows unchecked it will constrict the air passage, thereby dramatically reducing the amount of air that the engine can draw in. Even worse, it can freeze the carburettor so that the throttle position cannot be changed. Typically, the engine stops and will not restart, making descent the only option. Interestingly, when the plane is back on the ground (after either landing or crashing), the carburettor usually warms up, the ice melts, and nobody can find anything wrong.

The pitot head is another component prone to icing. When this happens, the ice blocks the pitot tube, which has the effect of preventing the dynamic (pitot) pressure being transmitted to your airspeed indicator; this instrument will then misbehave and give false readings. If the plane were to then lose speed, because of ice on the wings for example, you would not be aware of it. The static pressure vent system can also be

affected by ice; if this happens, the airspeed indicator, altimeter and vertical speed indicator instruments will all misread. Fortunately this is far less common than pitot icing.

Ice can also form on the windscreen during a flight, completely blocking out your forward view. This is similar to the effect of encountering freezing fog in road vehicles. If you are skilled at flying on instruments, this won't be too much of a problem during the flight itself but, if the ice persists, you may have difficulty seeing the runway properly for landing, which is normally regarded as essential for putting your wheels back on the ground.

How ice forms on an aircraft

Aircraft icing occurs when water freezes onto an aircraft. Other than in the case of snow (which is often in the form of sticky flakes), if the water is already frozen the ice crystals will not normally stick to the aeroplane. The water that causes most icing is in the form of droplets that range in size from raindrops down to the tiny droplets that make up clouds. In some cases the moisture may be simply humidity in the air. When the plane's surface (usually metal on larger aircraft) is below 0°C, any water that touches it will freeze to form ice.

The other way that ice forms is when the water is colder than 0°C . That's right – water below this temperature is not necessarily ice. Water can exist in a 'super-cooled' state, when it's a liquid just waiting for something on which to freeze. As soon as the droplet meets an object, such as your aircraft, it rapidly freezes and sticks to the plane like glue. Because of the thermodynamics involved, small water droplets effectively freeze the instant they touch your plane, whereas larger droplets can smear across the surfaces as they freeze. In extreme cases this can create a layer of ice stretching over most of the flying surfaces.

The simplest form of aircraft icing occurs on a parked aircraft on the ground; this is usually either hoar frost or rime, depending on how it was formed, but it could be snow. Hoar frost is produced by dew settling on a surface that is below 0°C and freezing instantly (sublimation), whereas rime is formed when frost and fog occur at the same time. The water droplets freeze when they touch the cold aircraft, and usually trap minute quantities of air at the same time, giving the characteristic white frosty look. Because the rime ice is formed when the droplets touch the plane, it generally builds up most on the windward side. All these varieties of icing can affect the aerodynamic performance with disastrous results, particularly during the critical take-off phase of flight. There have been occasions when jet airliners have crashed because they were not properly de-iced before take-off.



Using the pitot heat will prevent the ASI giving problems in icing conditions



Severe icing conditions can overwhelm de-icing systems when flying flat out

On the ground the aeroplane is stationary and the water droplets are moving. During flight it is essentially the other way round, and because the plane is moving much faster it can come into contact with far more droplets. All of this contact, and hence ice formation, will begin on the front edges of wings and other surfaces. This is the type of icing most commonly found in simulators, and will be either rime ice or clear ice. The rime ice is normally formed when a plane flies through a cloud of small super-cooled droplets, whereas clear ice generally occurs when the droplets are much larger (rain).

Whilst icing normally occurs when a cold plane is flying through super-cooled water droplets, it can also happen when a cold plane flies through a warm cloud or a shower of rain. Typically, the plane would be colder than the surrounding air if it has just descended from a higher altitude where the air is normally significantly colder. Another situation is when the plane is flying underneath a weather front; the plane can be in the cold sector, with the warm rain falling from the warm sector above.



Some days just aren't made for flying

When structural icing occurs, the drag increases, and as a result the pilot will slowly nudge the throttles forward to maintain speed. At the same time there will be a need to fly increasingly nose-up, to maintain altitude. For many pilots the actions required to maintain speed and altitude are almost instinctive, and hence it's not uncommon for a significant amount of ice to accumulate before the inexperienced pilot notices it; the pilot may not become aware of what's happening until the throttle has been moved nearly to the maximum position. If the ice forms on the propeller, which is likely to happen at the same time, it will also reduce the amount of thrust that can be produced. Furthermore, if the ice breaks off from only one propeller blade, leaving a large amount of ice on the other, it can create a worrying 'out of balance' vibration.

The other main category of icing is called induction icing; ice can form on the forward-facing surfaces of the engine intakes in the same way as on the rest of the plane. Air is normally fed to a piston engine through a filter, and on many small single-engined aircraft the filter is positioned just below the propeller. If ice forms on the filter it can block it completely and, with no air to mix with the fuel, the engine will rapidly stop producing power. The build-up of ice on the intake lips of gas turbine engines can be equally devastating, because the ice can break off and get sucked into the engine itself, wreaking havoc with the compressor blades.

The most common of all icing problems, however, is carburettor icing. This is caused by moisture in the air (humidity) freezing inside the carburettor. It does this because

the evaporation of fuel in the carburettor has a cooling effect that is strong enough to draw the moisture directly out of the air and form ice. (This is similar to the effect seen in a household freezer, where the 'frost' is formed directly from the humidity in the air.) The ice in the carburettor constricts the airway, thereby reducing the quantity of air that can enter the engine, and consequently reducing the power generated. The ice can also freeze on the internal moving parts, which can have the effect of locking the throttle in one position. Unfortunately there is a high chance of carburettor ice forming during a long descent, which can go unnoticed until the pilot decides to level out and tries to open the throttles; nothing happens, just at the time you most need the extra power. Carburettor ice is particularly dangerous because it is caused by the cooling effect of the fuel evaporation, which means that the air does not have to be below freezing for it to form. In fact it can form on a summer's day, typically in air temperatures up to 22°C. This means that even on a very hot summer's day of 30°C you could conceivably encounter carburettor icing at 4,000 feet if humidity is sufficiently high.

Dealing with icing

Some occurrences of icing are easy to control. It is, of course, essential to completely remove any snow or ice from the aircraft before take-off. Of more relevance to flight simulator pilots is regular use of the carburettor heat lever that is next to the throttle on the smallest of planes, such as the C182 RG. The lever should be pulled out for thirty seconds every ten to fifteen minutes, and left out continually at low engine rpm or power settings. For fixed-pitch propeller planes like the humble C152, the carburettor heat lever would be pulled out whenever the engine rpm is not in the green arc.

There are ingenious ways of determining whether carburettor icing is likely, but most pilots assume that it could happen at all times and act accordingly. For fuel-injected aircraft there is an 'alternate air' system, which draws air from inside the engine cowlings rather than through the filter; if the intake is blocked, using the alternate air will cure the problem. The carburettor heat

mechanism can also provide alternate air for emergencies. Clearing ice from the windscreen is simply a case of either heating the glass itself, or using hot de-misting ventilation air to clear it, in the same way as in a car. Pitot ice can effectively be kept at bay by switching the pitot heat on during pre-take-off checks and off after landing.

Systems for curing the problem of ice on the wings, tail and fin are much more complex and varied. There are two categories of equipment: anti-icing, which prevents ice forming in the first place, and de-icing, which removes it once it has formed. Ice can be prevented or removed by heating the front of the wing, most commonly by directing hot air from the engine compressor inside the leading edge. This is common on large jet airliners, but drains a lot of power from the engine. The heat can also be provided electrically, and this is a particularly common method for de-icing propellers.

There are also systems which discharge de-icing fluid from the front of the aerofoils. It's a simple solution, but it does require the plane to carry the fluid, and there is always the possibility that it could run out before landing. The most common system for medium-sized or small aircraft is 'rubber boots', which periodically inflate and deflate again; these are the black strips that can be found across the leading edges of a few single- and many twin-propeller aircraft. They work by allowing a significant layer of ice to build up on the leading edge (about half an inch) and then inflating; the swelling of the boot cracks the ice and breaks its grip on the front of the wing, causing the ice to fall away.

Most small basic aircraft have pitot heat and cabin heating, but aren't equipped with a de-icing or anti-icing system for their wings, fin or tailplane. Pilots are therefore obliged to avoid all but the lightest of icing. If airframe ice begins to form during a flight, your best bet is to descend into warmer air. If this is not possible, you should either execute a 180-degree turn to take you back out of the icing conditions, or land quickly at a nearby airport.

One interesting alternative is to climb higher, either out of the cloud or to an altitude where all the water will be ice crystals. This is really only an option if you detect the icing in its very early stages, or if you have planned to make a quick break through the icing layer; otherwise you will not have the power to climb out of danger. If you need to land in an aircraft which is carrying significant ice, be very careful; your landing speed will be higher than normal as a result of the ice changing the shape of your lift-producing wing, and the additional weight of the ice.



We had to add the ice to the leading edges ourselves. How long before your sim can model this?



At least airliner de-icing equipment is currently available (from German Airports Vol. 1)

Avoiding icing

Most airframe icing happens in either of two places, and if you avoid them you are unlikely to be embarrassed. Flying in cloud at temperatures between 0°C and -10°C is likely to result in the accumulation of significant ice, and there is potential for airframe icing either side of this temperature range. Icing can happen down to about -20°C, but below this temperature (or above this height) a cloud usually consists of ice crystals rather than water droplets.

At warmer temperatures ice is only likely to form if there are super-cooled raindrops in the air. This can happen when droplets fall from a higher altitude and have not warmed up by the time they reach the plane. You don't have to be in a cloud to be affected by these super-cooled raindrops, and typically this happens when flying just under a cloud. It can be particularly disconcerting to be affected by ice when you are flying below the clouds and at temperatures which are above freezing. Similarly, flying through rain when the air temperature is below 0°C can lead to particularly rapid icing.

Flight simulators such as FS2002 enable you to add icing to clouds in the weather menus. To try out the effect, create overcast cloud cover from 2,000 feet up to 9,000 feet. Set the icing to 'severe' and set the temperature to 6°C. Because the temperature decreases at a rate of about two degrees per thousand feet, this should give you a freezing level of around 3,000 feet (this may vary because of the different lapse rates in clouds). Leave the pitot heat off, and fly a small Cessna up into the clouds, aiming for a cruising level of 5,000 feet.

The airspeed indicator should stop working soon after you pass the 3,000-foot freezing level, but is easily reactivated with the pitot heat. When you are cruising at 5,000 feet, however, the airspeed, ice and consequent drag will start to increase. Soon you will see your speed creeping down, despite being at full throttle. Eventually your only option will be to descend, but try climbing and see what happens. If you were flying over mountains this could be a particularly dangerous situation in which to find yourself. Once the outside air temperature is back above 0°C, the ice should start to drop

off and you can fly normally again. Try the same flight in different aircraft and in different icing conditions, both with and without de-icing switched on, and you will gain a feel for what level each plane can cope with.

While today's flight simulators don't currently represent much in the way of icing, the effect is modelled to some extent. As realism continues to improve, you will no doubt soon be able to look out of your cockpit and see ice on the wings and struts, and then your standard checks will have to include regular visual checks of the wings for the build-up of ice. Until then your simulation will be more realistic if you routinely add icing to the weather you fly through. Otherwise, when flight simulators become capable of generating more realistic weather patterns, or if you choose to fly in the real world, you may encounter some nasty icy surprises. Whilst ice is best kept for drinks, it's an unavoidable element of aviation, and every pilot should know how to recognise and handle it – whenever and wherever it turns up. ■

Stephen Heyworth

Credits

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The Spirit of Adventure

The lonely flight of Charles 'Lucky' Lindbergh



Nowadays anyone can buy a ticket for a flight from New York to Paris, and the trip will take up about eight hours of your time. The major inconveniences on the journey are likely to be the airport security, baggage delays and a cramped seat. With a bit more cash you can do the journey in Concorde and only spend three hours aloft. Now that air travel has become so mundane, it's difficult to imagine how different things were 75 years ago, when a young man from Little Falls, Minnesota, made the first non-stop flight from New York to Paris; Charles A. Lindbergh travelled alone and in a single-engined aeroplane that had been designed and built within four months. The first major journey of the Ryan NYP was on 10 May 1927, from its workshop in San Diego to New York. Its second flight was to Paris, ten days later!

A young man makes history

When WWI ended in 1918, the world was left with a huge number of qualified pilots, for whom a safe office job was no substitute for the thrill of combat flying. One outlet for their skill and daring was competing against time, distance and the weather in return for a cheque and a place in history. Since the very early days of flight, rich benefactors had put up large prizes to tempt daring airmen (and women) into pushing the boundaries of speed and endurance. Bleriot's Channel flight in 1909 won him £1,000 from the Daily Mail, and in 1919 John Alcock and Arthur Whitten Brown received a cheque for £10,000 from the same newspaper for the first successful non-stop crossing of the Atlantic in their Vickers Vimy.

By the mid-1920s the size of the prizes had increased and so had the challenges. Raymond Orteig, a millionaire hotelier, offered \$25,000 for the first non-stop flight between New York and Paris. Among those who took up the challenge was a young mail delivery pilot called Charles Lindbergh. He decided to try for the prize in the autumn of 1926, and thought that it might be feasible if he could only obtain one of the new Wright-Bellanca aircraft. At about this time French air ace René Fonck was making a narrow escape from the burning wreckage of a Sikorsky S-35 after his attempt at the Orteig cheque ended in an explosion on the runway. A number of other famous pilots had their sights set on the challenge, including another French ace, Charles Nungesser, and Commander Byrd, the North Pole hero.

The full story

The most comprehensive Charles Lindbergh resource available is Pat Ranfranz's site at www.CharlesLindbergh.com. This is one of the best websites we've ever seen, irrespective of subject. As well as pictures, historical information and links, it even has film footage and music! A must-read for budding Lindbergh imitators is Pat's timeline of the epic flight.

7:52am - Charles Lindbergh takes off from Roosevelt Field, Long Island, New York. The heavy plane, loaded with 450 gallons of fuel, clears telephone wires at the end of the runway by only 20 feet.

8:52am - Altitude: 500 ft. Wind velocity: 0 mph. Currently over Rhode Island. Except for some turbulence, the flight over Long Island Sound and Connecticut was uneventful. Only 3,500 miles to Paris.

9:52am - Boston lies behind the plane; Cape Cod is to the right. Altitude: 150 ft. Airspeed: 107 mph. Wind velocity: 0 mph.

10:52am - There's a breeze blowing from the NW at 10mph. Lindbergh begins to feel tired, although only four hours have passed since leaving New York. He descends and flies within ten feet of the water to help keep his mind clear.

Lindbergh got the backing of a group of St. Louis businessmen and set about buying the only existing Wright-Bellanca. After much discussion it appeared that it was not for sale unless the owners could select the crew. Undeterred, Lindbergh already had a back-up plan, and he had contacted the Ryan Aeronautical Company in San Diego to see if they could build a plane that would get him to Paris; they agreed to construct something similar to their M1 mail plane for \$6,000, and extra for engine and instruments.

Lindbergh gave Ryan the go-ahead on 25 February 1927 and, in exchange for \$10,580, they built the Ryan NYP (New York-Paris) and fitted it with a Wright J-5 engine. By the end of April it was ready to fly, just sixty days after it had been designed. It was christened Spirit of St. Louis in recognition of Lindbergh's backers, and is arguably the most famous aeroplane ever built.

By the beginning of May excitement was building, and the press had now got wind of Lindbergh's plans and realised he was a serious contender. The Wright-Bellanca, now flown by Clarence Chamberlin, was rumoured to be ready to go and the papers had the makings of a race on their hands. Then, on 9 May, Nungesser and Coli took off from Paris in their Levasseur biplane, The White Bird, and everyone waited in anticipation. The following day Lindbergh climbed into his new Ryan and flew from San Diego to New York in less than 22 hours – a record in itself.

After Nungesser and Coli crossed the French coast, nothing was ever heard of them again, and it's generally assumed that they perished somewhere over the Atlantic. Meanwhile the Wright-Bellanca became the subject of a legal wrangle and Commander Byrd wasn't ready. At 7.52am on 20 May Lindbergh put paid to any further speculation about the 'race' and took off from Roosevelt Field heading east.

Just over 33½ hours later he landed at Le Bourget and was met by a hysterical crowd of Parisian well-wishers; his life changed forever, he suddenly became the most famous man in the world. Lindbergh's flight generated a huge amount of interest in air travel and within two years the number of



The simulated Spirit – a worthy tribute from Flight One

civilian air passengers in the US had risen from 40,000 to 250,000.

It's hard today for us to fully comprehend just what an amazing feat Lindbergh performed, and its 75th anniversary caused some discussion amongst the PC Pilot team about the possibility of repeating the flight today. It's unlikely that you'd ever get permission to fly a single-engined plane non-stop from New York to Paris, so we decided to see if we could do the next best thing and make the flight using Flight Simulator 2002. It proved to be a very interesting journey.

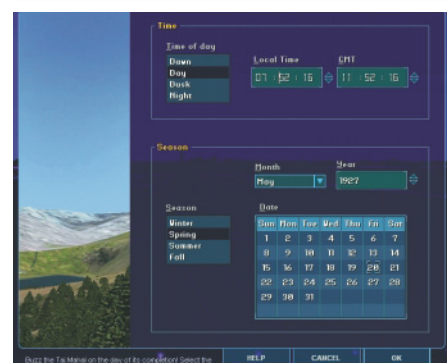
We need a Ryan!

The Spirit of St. Louis was a unique aircraft, and the first requirement in our Atlantic attempt was to find one that was suitable for flying in FS2002. Fortunately we discovered that US developers Flight One had created an excellent replica of the Spirit as a tribute to the 75th anniversary of Lindbergh's flight and, even better, they were giving it away on their website (www.flight1.com). We quickly downloaded it and after a few minutes (it self-installs) we were cruising around above Meigs.

The first thing you notice about the Ryan, when you're in the cockpit, is that the panel seems to be in the wrong place, as it completely obscures the windscreen. Don't be fooled; the panel is completely authentic, because the Spirit of St. Louis had no windshield – its place was taken up by the huge petrol tank mounted in front of the



The first bit's easy – if you can see where you are!



Set the time and the date, then get ready

cockpit. Lindbergh's only view for 3,600 miles was out of the small side windows or via a periscope in the middle of the panel. This certainly makes for interesting flying, and it's now that you begin to appreciate why Charles Lindbergh was such a special individual. Also on the panel you'll see a complicated array of pipes and taps. These were what Lindbergh used to balance the fuel between the various cells within the tanks; each hour during the flight he switched from one to another.

11:52am - Four hundred miles from New York. Altitude: 200 ft. Nova Scotia appears ahead. After flying over the Gulf of Maine, the Spirit of St. Louis is only six miles, or 2 degrees, off course.

12:52pm - Wind velocity has increased to 30 mph. Lindbergh flies over a mountain range. Clouds soon appear and thicken as the Spirit of St. Louis approaches a storm front.

2:52pm - Altitude: 600 ft. Air speed: 96 mph. Lindbergh's course takes him away from the edge of the storm. Wind velocity has dropped to 15 mph.

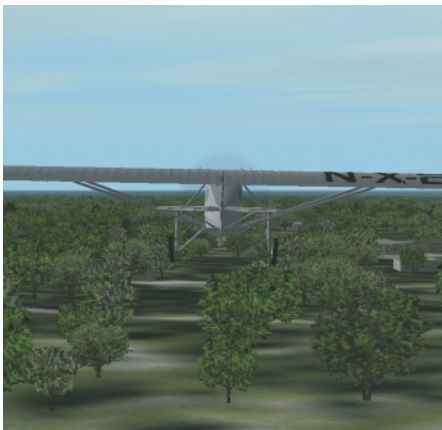
3:52pm - The eastern edge of Nova Scotia's Cape Breton Island lies below. In minutes Lindbergh will be over water again. Although it's only the afternoon of the first day, Lindbergh struggles to stay awake.

5:52pm - Flying along the southern coast of Newfoundland. Altitude: 300 ft. Air speed: 92 mph. Wind velocity: 20 mph.

7:52pm - Stars begin to appear in the sky as night falls. The sea below is completely obscured by fog. Lindbergh climbs from an altitude of 800 ft to 7500 ft to stay above the quickly rising cloud.



Pilotage is simple in theory, but not without a clear view



Phew! We're just going to clear those trees

Where's Roosevelt?

Once we had an aeroplane, it was time to plan the route. Lindbergh took off from Roosevelt Field, Long Island, which is now a shopping mall. Although it's probably got a commemorative brass plaque, it's no good for flying, so we had to find a modern alternative. The nearest one was Republic airport at Farmingdale; it's only a few miles east of Roosevelt, and so wouldn't affect the outcome of the flight. The destination, Le Bourget, is still there, so we were now able to enter a start and an end point into the FS2002 flight planner. This gave us 38 VOR beacons and navigational intercepts to follow, none of which were around in 1927! Once these were deleted, the planner draws a route that is almost identical to Lindbergh's.



Do the final checks before take-off and take a deep breath



The great circle track – a straight line on a curved surface

The route follows a curved line, known as a 'great circle'. It may seem odd to follow a curve between two points, but this is because the map is flattened out to 2D, so a straight line on the globe becomes a curve on a flat map. Alternatively, you can use FS

Navigator, which is also handy if you need to cheat at a later stage of your trip. Without the luxury of FS2002 and FS Navigator, Lindbergh's route planning was a little different, as this account from Lindbergh by A. Scott Berg makes clear:

8:52pm - Altitude: 10,000 ft. The cloud that first appeared as fog is still below. A thunderhead looms ahead. Lindbergh files into the towering cloud, then turns back after noticing ice forming on the plane.

10:52pm - Lindbergh's fight to keep his eyelids open continues. To keep warm, Lindbergh considers closing the plane's windows, but then decides that he needs the cold, fresh air to help stay awake.

11:52pm - Altitude: 10,000 ft. Air speed: 90 mph. Five hundred miles from Newfoundland. The air has warmed – there's no ice remaining on the plane.

1:52am - Halfway to Paris. Eighteen hours into the flight. Instead of feeling as though he should celebrate (as he had planned), Lindbergh feels only dread: eighteen long hours to go.

2:52am - Daylight! Because Lindbergh has travelled through several time zones, dawn comes earlier. The light revives the pilot for a while, but then drowsiness returns. He even falls asleep, but only for a moment.

4:52am - Flying in the fog. Lindbergh continually falls asleep with his eyes open, then awakens seconds, possibly minutes, later. The pilot also begins to hallucinate. Finally, after flying for hours in or above the fog, the skies begin to clear.

While the Ryan employees created a skeleton for the wings out of spruce and double piano wire, Lindbergh prepared his course. Over a drafting table in Donald Hall's office he spread his charts and applied what he remembered from Army navigation class. He broke the great sweeping curve of his route into three dozen line segments, each representing one hundred miles, approximately one hour of flying time. "At each point," he recalled, "I marked down the distance from New York and the magnetic course to the next change in angle." He proceeded so quickly that he felt he should double check his figures by working the route again, this time using trigonometry. After several days of tedious calculations that led to a virtual duplication of the first half of the course, he quit, extrapolating that the second half was just as correct. When he realized that his markings – "that curving, polygonic line, cutting fearlessly over thousands of miles of continent and ocean" – were enough to direct him to the final dot on the map labelled "Paris", he crossed off his equipment list any radios or even a sextant for further navigation. That saving was worth another 25 gallons of gasoline.

Let's get going

All that remained for us to do was load up with fuel and get ready to take off. Flight One's Spirit of St. Louis has a capacity of 425 gallons, although Lindbergh managed to squeeze 450 gallons into the real Spirit. It doesn't matter, as he made it to Paris with enough spare to have got to Rome. Better that than running out over Ireland! Once we'd fuelled up we set the FS clock to 07.50am on 20 May, started the engines, and rumbled along the runway. The simulated Spirit probably unsticks a bit easier than the real one – we're told that Lindbergh only just cleared the telephone wires at the end of the runway – and once airborne we climbed to 500 feet and headed north-east on a bearing of 65 degrees.

Where are we?

During his time as a mail pilot, Lindbergh found his way around by using pilotage, which is navigating by following rivers, roads, coastlines and other features on the landscape. He would also have used DR



That's Cape Cod behind us and Nova Scotia's next



The Newfoundland coast is ahead, but those clouds look ominous



We'll soon be leaving Newfoundland and then we're on our own

7:52am - Twenty-four hours have elapsed since taking off from New York. Lindbergh does not feel as tired.

9:52am - Several small fishing boats spotted. Lindbergh circles and flies by closely, hoping to yell for directions, but no fishermen appear on the boats' decks.

10:52am - Local time: 3:00pm. Lindbergh spots land to his left and veers toward it. Referring to his charts, he identifies the land to be the southern tip of Ireland. The Spirit of St. Louis is 2.5 hours ahead of schedule and less than three miles off course.

12:52pm - Wanting to reach the French coast in daylight, Lindbergh increases air speed to 110 mph. The English coast appears ahead. The pilot is now wide awake.

2:52pm - The sun sets as the Spirit of St. Louis flies over the coastal French town of Cherbourg. Only two hundred miles to Paris.

4:22pm - The Spirit of St. Louis touches down at the Le Bourget Aerodrome, Paris, France. Local time: 10:22pm. Total flight time: 33 hours, 30 minutes, 29.8 seconds. Charles Lindbergh had not slept in 55 hours.

Source: The Spirit of St. Louis, by Charles A. Lindbergh



The sun sets as we pass the French coast at Cherbourg

(dead reckoning), which is combining a compass course, time, airspeed, wind speed and direction to work out his most likely location. His epic journey over the Atlantic would be one of the most difficult feats of navigation so far undertaken by a solo pilot. For the first ten hours or so of the flight, however, he would have been able to use his pilotage skills and normal map reading, flying from Long Island to the last edge of the Newfoundland coast. This is almost a third of the great circle route to Le Bourget.

Like Lindbergh, once we left the land we were truly on our own. He would have studied thoroughly the most likely winds across the Atlantic, for they were likely to be the greatest source of danger. If you get the wind wrong using DR over a distance of that magnitude, you'll die. We couldn't replicate the exact weather he experienced, as even he was only guessing what the winds were doing, so we had to rely on a slice of 'Lucky' Lindbergh's luck.

He would have plotted his true intended track before he left. Then, applying the amount of drift, the magnetic variation along the way, the wind speed and direction (largely guesswork at this stage), he would have come up with a magnetic compass course to steer. Once over the sea in daylight it is possible to check the wind speed and direction visually by looking for wind lanes and at the wave tops. This is the main reason he kept so low, sometimes no more than 500 feet above the water, as wind direction and speed change with height. The



Lindbergh circled the Eiffel Tower when he arrived and so did we!



After 33½ hours the lights of Le Bourget are a welcome sight

nearer you are to the wind signs you are looking at, the more accurate they will be.

There are various wind-finding techniques over water. The most common is to drop a floating marker of some kind and fly a very accurate circle or rectangle from it, so that in still air you would fly exactly over it again after, say, six minutes. If you are very accurate in windy conditions, you will end up in a spot downwind of the marker, on a bearing of the wind direction and one tenth of the speed away in distance. This is difficult for a solo pilot to achieve, and we don't know whether Lindbergh used this technique or not. FS2002 has not yet advanced to this level of accuracy so our choices were to rely on the compass or cheat. We chose the latter and took a few peeks at the World Map on the way.

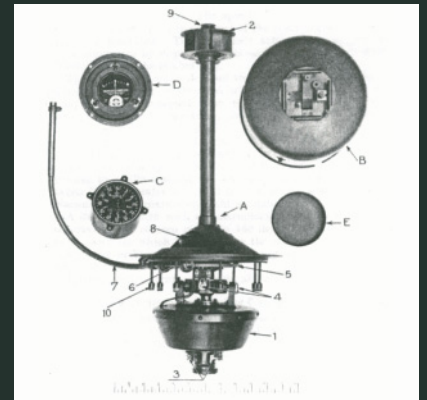
After about fifteen hours over the sea, Lindbergh spotted the southern tip of Ireland and was only three miles from his estimated DR position. With winds of up to 20 miles per hour during most of that time, he could theoretically have been $15 \times 20 = 300$ miles out of position. By any account his was a remarkable achievement in wind guesstimation, as he had none of today's Met forecasts or updates to help him. From southern Ireland onwards he was almost back to map reading and pilotage for the last six hours, which must have been a huge relief. We were able to do the same, but as night fell over France this was no easy task.

Eventually we saw the lights of Paris ahead and found our way to Le Bourget. Lindbergh had great difficulty finding the airport, because all the lights appeared to be wrong. What he didn't know was that he was seeing 150,000 people stuck in traffic jams on their way to Le Bourget! Modern lighting helps you pick out the airport easily, and we were able to bring our Spirit down on to the runway without a mishap.

We had to conclude that you can't fully replicate Lindbergh's flight in FS2002, partly due to the limitations of the simulator, and also because his flight was such an amazing

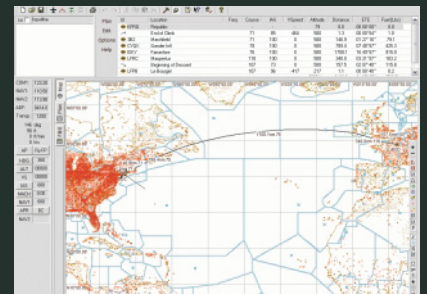
Compass course

Lindbergh's flight was also famous for its pioneering use of the Earth Inductor Compass; this was basically a cross between a compass and a dynamo that uses the earth's magnetic field as the magnet. The compass knob was rotated to indicate the desired heading, and this in turn rotated the brushes of the generator so that there was no flow of current when the aircraft was headed in the indicated direction. The pilot steered until the needle came to zero and stayed on course. One drawback was that there were two zeros, so it was necessary to work out which zero was which, or you'd be flying at 180 degrees to your intended course.



Do you feel Lucky?

If you want to attempt the flight in FS2002 yourself, then you'll find the flight plan files and also Flight One's Spirit of St. Louis on our cover CD. Simply select the Lindbergh button, or go to My Computer, right click on the CD icon, select Explore and then open the Lindbergh folder.



feat of skill and daring that it's still almost impossible to work out exactly how he did it. It's worth bearing in mind that modern-day solo pilots who deliver light aircraft between America and the UK have the use of all those beacons, a GPS and radio, and they usually fly via Greenland and Iceland, stopping overnight at least twice. If you decide to try the flight for yourself, remember that Lindbergh had no sleep the night before the flight and that by the time he reached Paris he'd been awake for about 60 hours. As they say on TV – don't try this at home!

Chris Jarman

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NASA Space Shuttle Simulator

Ground Control to PC Pilot

Had enough of Flight Simulator 2002?

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Want the ultimate flight simulator?

*Well, how about NASA's unique
Space Shuttle simulator at the
Johnson Space Center?*

*Matthew Stibbe was lucky enough
to get the chance to swap his
flying goggles for a space suit...*

The simulator is used to train each and every Shuttle commander and pilot and to rehearse missions, but there's occasionally some unallocated time; NASA uses this to give VIPs (including Tom Hanks and Bill Clinton) and not-so-distinguished members of the press a chance to experience flying the Shuttle. It took six months to set up the clearances, but one Friday I eventually got a call from the Public Affairs Office in Houston offering me an appointment for 8.00am on the following Wednesday. Since the simulator is in use for sixteen hours each day I didn't want to miss my chance, and so I was on a plane to Texas two days later.

I arrived at NASA's security office at the unreasonable hour of 7.00am, to wait alongside two Texas Rangers in their distinctive ten-gallon hats and creased denim uniforms, and a dozen fighter pilots in full Top Gun outfits. After my escort arrived and took me to the simulator hall, I was shown the various control rooms from which the instructors and technicians run the simulations – not just the Shuttle, but also the International Space Station sim. These are not the vast mission control rooms that you see on television coverage, but are more like the offices of bond dealers – full of screens and expensive swivel chairs.

The simulator group employs 135 people in total. Our flight only needed five operators, but a full integrated mission simulation might have hundreds working on it in Houston, Moscow and Florida. Inside the hall itself there are several simulators: a couple of procedural simulators, a fixed-base simulator, which is used for flight training but which doesn't physically move, and my ride for the morning, the full-motion simulator. This actually looks like the sort of equipment an airline pilot might train on – a platform raised up on hydraulic rods, surrounded by numerous pipes and cables.

I took my place in the pilot's right-hand seat and my instructor, Bill Todd, took the commander's position on the left, before we put on headsets so we could talk to each other and our team of five controllers. Bill issued an order over the radio and the whole platform shook into life. "Make sure you're strapped in tight," said Bill with more sang-froid than a Guards officer on a cold day. "Why?" I asked. "Because the whole thing's going to tilt now." As he spoke, I could feel the pressure on my back increasing, and after a few seconds I realised I was lying flat on my back. This was Bill's little surprise. Unlike airline simulators, the Shuttle sim can tilt back a full ninety degrees to simulate the launch attitude.

Lying on my back, it was hard to reach the buttons overhead and in front of me. All the controls are Tonka-sized so that they can be operated by gloved pilots, but it was hard enough to reach them even with just the Earth's gravity bearing down on me. With a pressure suit helmet on, the overhead



Inside the Shuttle sim – has anyone seen the manual?

toggles are not visible, so pilots must rely on their memory to know which switches to throw. Luckily a third crew member, sitting between and behind the two pilots, checks that they switch the right ones. Then the screens came alive and I could see the launch tower out to the left behind Bill's seat, the sun up ahead and, by lifting my head a little, an area of coastline.

The first sortie was to be a launch and 'return to landing site' abort. Bill called this a 'twofer', because the participants get a launch and landing on the same trip – 'twofer the price of one'. We were going to blast off from Kennedy Space Center and reach the edge of space over the mid-Atlantic, at which point the operators would simulate a main engine failure and we'd have no choice but to jettison the solid rocket boosters and external fuel tank, and glide back to Kennedy.

After Bill started the launch sequence, everyone in the cabin recited the ritual countdown. 3... 2... 1... Lift off. The cabin vibrated and rocked back and forth as the main engines and then the solid rocket boosters ignited, and the launch tower slid smoothly away. Shortly after take-off the Shuttle rotates and flies inverted, giving an extraordinary view of the entire Florida peninsula below, and soon the curvature of the Earth. There was a jolt as the solid

rocket booster separated, and then all was smooth again.

A few minutes into the climb, the pressure in one of the engines dropped visibly and Bill initiated the abort. This is an extremely complex ballet in the upper atmosphere that turns the Shuttle around and uses the remaining engines to slow it down; it then free-falls almost vertically for about 100,000 feet until the aerodynamic surfaces become effective and it can begin to glide down. The whole process is controlled by the simulator's computers, which, incidentally, run the same flight control software as the real Shuttle, and on the same hardware. Luckily, my only job on this first flight was to deploy the air data probes once we had re-entered the atmosphere (60,000 feet and 280 knots), and then lower the landing gear and release the slow-down parachute; Bill flew the last few thousand feet manually to a perfect touchdown.

The motion base really comes into its own on approach and landing. After Bill's demonstration, the sim was reset to put us at the top of the drop for the approach into Kennedy after an abort. "You have control," said Bill. Earlier he had commented that "people who play video games tend to do better at this than real pilots." Since I'd spent most of my adult life designing video games and have a PPL, I figured I had the best of both worlds, and took this as a challenge.



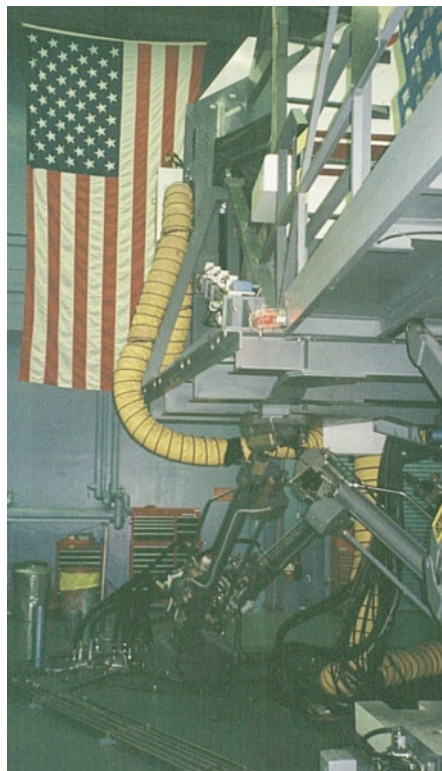
It's lot harder in a full spacesuit

The approach bears a surprising resemblance to a standard overhead join, such as you might do at any small airfield in England, in that you fly west to east over the top of the north-facing landing runway, then turn and descend on the 'deadside' before looping back over the runway, turning downwind and then onto finals. The differences are that you start at 50,000 feet rather than 2,000, the crosswind leg is over 25 nautical miles as opposed to half a mile or so, and the rate of descent is dramatically faster. To put it another way, on my approaches into Denham I don't normally make sonic booms or turn base over Cambridge.

Needless to say, the Shuttle is a glider and the trick is to land first time, every time. Consequently, it flies a very steep glideslope – not the 3-4 degrees of a commercial airliner. It lands at a speed of 195-200 knots, significantly faster than a jumbo jet, partly because of its fast approach and partly because of its delta wing. Concorde lands at a high speed for the same reason.

For the approach, Bill explained that we needed a steep nose-down attitude, only pulling up on finals. The 'picture' of the runway (the aspect ratio of the runway which shows whether you are too high or too low) is dramatically different from what I am used to and is, in fact, more like the view a dive bomber might get. "Because of the delta wing," Bill explained, "You can't fly it to the ground." Instead, once over the threshold, you pull back on the stick and flare the aircraft, pop the 'chute and let it settle on its own cushion of air. Once in the flare, it's not too dissimilar from landing a normal plane: "Look at the end of the runway and hold the nose relative to that."

I flew two full approaches manually. On the first, I managed to get the Shuttle onto the runway (just) but I wasn't terribly straight, and this prompted Bill to comment, with a laconic Texan accent, "Steer onto the centreline for the cameras – it doesn't matter where you touch down; it's where you end up that impresses the journalists." My second approach was performed in cloud down to about 400 feet, and I managed to get onto the runway and hold the centreline until I came to a complete stop. Bill's comment: "Pretty good, but real astronauts have to do it in a crosswind, in pressure suits, under stress, and after two weeks of weightlessness in orbit."



The world's most advanced simulator, although you wouldn't know it from the outside

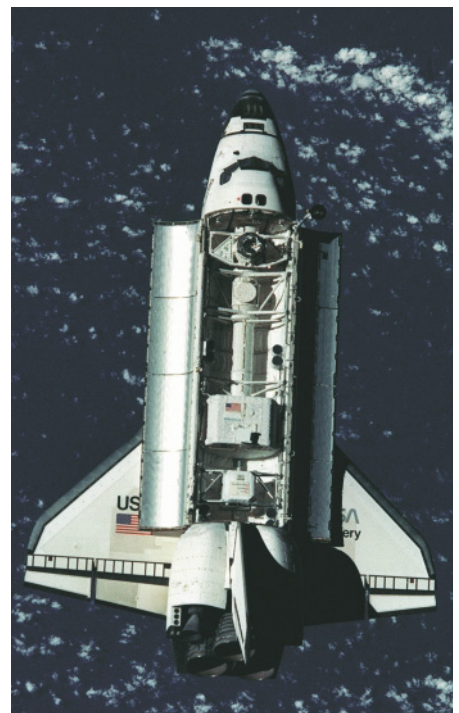
He told me afterwards that, just before the launch of the first Shuttle flight, the commander, veteran John Young, had a heart rate of 80 while that of his pilot, first-timer Bob Crippen, was up to 160. I was definitely in the Bob Crippen camp! The NASA minder who was escorting me, however, had a go and landed in the swamp. This made me feel much better about my performance.

As a flying machine, the Shuttle feels very stable. The joystick controller drives a fly-by-wire control system which triggers reaction control rockets in space, and aerodynamic surfaces in the Earth's atmosphere. The controller has a particularly solid feel – more Mercedes than Microsoft – and resists hasty or aggressive manoeuvres. The vehicle also has considerable inertia, and these factors combine to make it fly both smoothly and precisely. I've flown 767s and 747s on

British Airways' simulators and the Shuttle feels similar, but perhaps a little sprightlier.

The simulator is fitted with the latest in Shuttle avionics, including new multi-function displays. The flight control software has to cope with a number of different modes: launch, abort, orbital, docking, re-entry, approach and landing, and the screen displays match the mode. The approach display is broadly similar to an airliner display but the gauges are subtly different; angle of attack assumes a higher importance, and airspeed is displayed in KEAS, which stands for Knot Equivalent AirSpeed. In the upper atmosphere there isn't enough air pressure to get a meaningful airspeed, and this is an analogue used to give a sense of the vehicle's speed.

Where you might expect to see something like a direction indicator or HSI, there is a strange display which shows three small circles moving inside a constantly changing geometric shape. The three circles predict the Shuttle's position at different points in the future and the shape is actually the HAC, or Heading Alignment Cone; this is much like a funnel down which the Shuttle must fly. Luckily, the head-up display simplifies everything by giving you an incredibly simple flight director display. A square represents the actual heading of the Shuttle, and a diamond indicates the desired heading as calculated by the computers. If you keep the diamond inside the square on the HUD, you're doing fine. I suspect this is why Bill thought that gamers were better than trained pilots at landing the sim. The head-up display also shows rate of descent, speed, angle of attack and – on finals – a projection of the runway itself to give the pilot a 'picture' even in cloud conditions. For instrument approaches, this is an easier presentation than a traditional ILS.



Discovery approaching Russia's Mir space station



Endeavour touching down at the Kennedy Space Center last year

"It's the most sophisticated simulator in the world, by far," Bill explained after our flight. Besides simulating all the different ways a Shuttle flies, every component is modelled so that different kinds of failures can be thrown at trainees. The Shuttle is part of a worldwide simulator network, and it can link to mission control in Houston, launch control in Florida, Russian mission control and mission- or ISS-specific simulators. You could think of it as a virtual airline that plugs into a virtual operations system, other aircraft and three different air traffic control simulators.

So, how does it rate in terms of flight simulation? The visuals aren't as good as those in Flight Simulator 2002, although

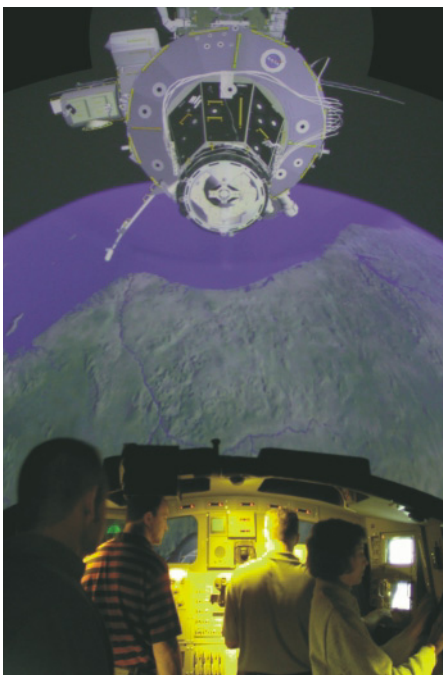
they are reasonable for a system that was first built in 1980, and they compare well to commercial simulators. The accuracy of the flight model and flight control software is, of course, as good as is humanly possible. The panels, displays, seats and controllers are flight-rated and again are as accurate as possible. The motion base, the piles of checklists and manuals everywhere, and radio chatter from the controllers through the headsets all add to the sense of realism.

Particularly human touches are the half-dozen kitchen timers Velcro'd to every free surface, and the pens and pencils attached at various points. These reminded me that this is a simulation of a real flying vehicle,

and that these are the sort of items that real pilots have in their aircraft. When you consider that a pilot in training for a mission would fly several four-hour profiles a week prior to launch, and that they are graded by computer on the accuracy of their landings and even on the amount of tyre and brake wear they cause, it's easy to imagine that for most pilots the Shuttle simulator in Houston is a real aircraft.

For more information on the Johnson Space Center and the Shuttle, some useful reference sites are www.spacecenter.org, <http://spaceflight.nasa.gov>, and www.jsc.nasa.gov

Matthew Stibbe



NASA astronauts participating in a simulation exercise in the system engineering simulator at the Johnson Space Center

Shuttle basics

It's amazing to reflect that successful Shuttle launches and operations are barely newsworthy any longer. The world's first reusable spacecraft – which launches like a rocket, manoeuvres like a spacecraft in Earth orbit, and lands just like an aeroplane – has passed quickly from being the stuff of science fiction to an instantly recognisable milestone in the history of space travel.

Four Space Shuttle orbiters – Endeavour, Atlantis, Columbia and Discovery – are currently operational, and each has been designed to fly at least 100 missions; so far their combined mission total is less than a quarter of that figure. The first Shuttle, Enterprise, was used in the late 70s, but only for approach and landing testing.

The Shuttle consists of three main components – the orbiter, where the crew are housed, the central external fuel tank, which holds fuel for the main engines, and the rocket boosters on either side, which provide most of the lift during the first two minutes of flight. Only the external fuel tank is not reused; it burns up in the atmosphere after each launch, and is jettisoned around 8½ minutes after launch.

Missions generally last between five and sixteen days, and the crew usually numbers between five and seven. To date more than 1.36 million kilograms of cargo have been taken into orbit by Shuttles, and over 600 crew members have taken part in missions. In the last ten years the safety of flying the Shuttles has been tripled, and over the same period operating costs have fallen by more than 40%. NASA expects the Shuttle to be flying for at least another decade.

Length: 184.2 feet (Shuttle), 122.17 feet (orbiter)

Height: 56.67 feet (orbiter on runway)

Wingspan: 78.06 feet

Orbit velocity: 17,321mph

Space Sims

Out of this world



X-Plane shuttle on the runway

While most of us won't get the opportunity to fly NASA's sim, there are several ways of flying the Shuttle at home. NASA itself has a laptop-based landing simulator which astronauts take into space and use to rehearse landings during long missions, so there's nothing wrong with a bit of practice on a PC. A program called Exoflight (www.fasterlight.com/exoflight) looks promising, although it isn't yet available, and so these three programs are the best bet for aspiring astronauts...

X-Plane

X-Plane comes with a Shuttle aircraft model and panel, and the X-Plane website has some useful landing instructions. It can simulate a full re-entry, or just the approach and landing, but not launch or orbital operations. As a Shuttle simulator, it does have a few deficiencies; there's no autopilot so all landings must be hand-flown without the benefit of a flight director, and the appearance and contents of the panel are not at all realistic. It does, though, have a head-up display and basic multi-function screens that give you a Shuttle-like glideslope and velocity vector display. The X-Plane Shuttle is seemingly more difficult to fly than NASA's version – more skittish and less precise – but the fundamentals feel similar. Without the flight director, landing the Shuttle in X-Plane is a real challenge, particularly after a full re-entry.

You can, of course, take a flight over Mars in X-Plane. Austin Meyer has made use of NASA's extensive research into Martian conditions, so leave your current knowledge of flight physics on earth and enjoy the perfectly simulated conditions of the red planet – it's genuinely fascinating.

Shuttle

Virgin's 1992 program, Shuttle, is a much more complete space flight simulator, and includes launch, orbital operations, docking, re-entry and landing. The only problem is getting hold of a copy; most owners bought their copy a decade ago, but you might be lucky and find a copy in an online auction. Failing that, some diligent online searching at an 'abandonware' site may turn up a copy, although its actual copyright status and the legality of doing so are questionable at best.



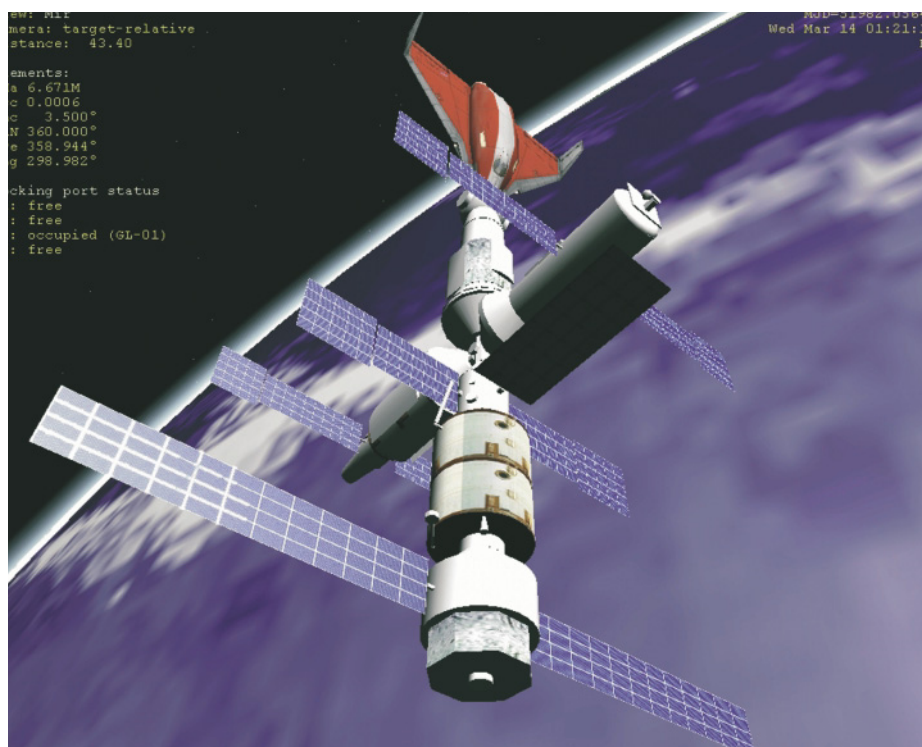
Discovery prepares for approach in X-Plane

Because of its age, the graphics are primitive VGA sticks and triangles, although on today's machines they move smoothly enough. In many ways the graphics are comparable to those on NASA's simulator, in detail if not in resolution. Displays include all the usual external flying camera viewpoints, views out of the window from both the commander's and pilot's seat, each of the three multi-function displays, and a large scrolling panel with functioning switches.

The Shuttle can be flown in a variety of modes, from fully automated demo to flip-every-switch-yourself expert, and you advance through a series of graduated missions; start by landing the Enterprise after being carried aloft on the back of a 747, and work up to a space station docking mission and a Hubble repair scenario.



X-Plane's Shuttle panel is excellent, if not strictly accurate



Orbiter's version of the famous Mir space station

The initial stages don't throw up too many problems, but after that it gets overwhelmingly complicated, and studying the manual is absolutely essential. This is, however, still the closest you can get to actually flying the Shuttle on your own PC.

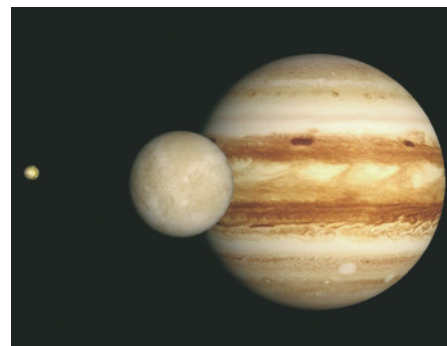
Orbiter

Orbiter is a space flight simulator which can be downloaded free of charge from www.orbitersim.com. At over 60Mb it's a hefty download, but the system requirements are moderate, so you won't need the most up-to-date processor and graphics card to enjoy it. Orbiter was developed as a hobby by Martin Schweiger (who wrote his first flight sim on a Commodore 64) and is an ongoing project; the latest major upgrade was released in April this year, and add-on developers are welcome. The AVSIM website (www.avsim.com) has an Orbiter section in its file library, and Martin has even made available an SDK to assist developers. If you've ever felt the need to create a totally new solar system, here's your opportunity.

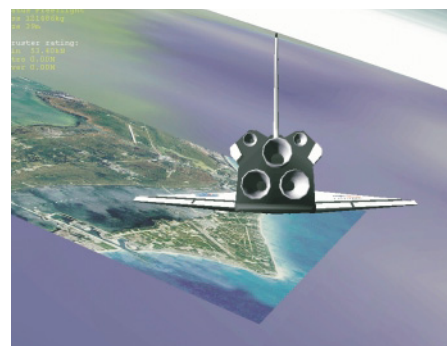
Orbiter simulates everything from orbital mechanics and docking to take-off and landing; it includes a number of imaginary spacecraft as well as the Shuttle, in which it is possible to blast off, orbit, dock and land. It's not a Shuttle systems simulator like Virgin's Shuttle, nor is the flight model as aerodynamically accurate as the one in X-Plane, but Orbiter is highly realistic in terms of physics modelling, gravitational fields and so on.

The visuals are wonderful, especially the view of Earth from space, and the whole launch and re-entry sequences look fabulous. The terrain around Kennedy looks as if it has been taken from a satellite photo and is particularly impressive, at altitude more so than close up; this is listed as one of the limitations of the sim on the Orbiter website, but expecting global elevation data in this context might be asking for a little too much.

The Shuttle in Orbiter seems much harder to fly than those in the other two simulators – it felt as though the inertia had been turned



Patrick Moore would love Orbiter!



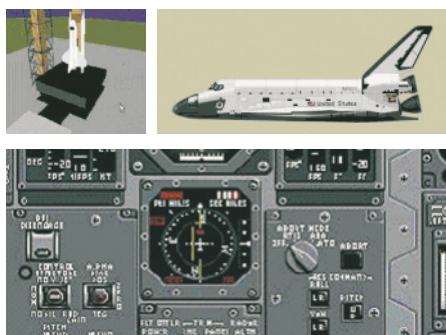
Steady... these don't come cheap

right up, and it was very hard to get it to turn. It's worth pointing out that this isn't a sim for the casual flyer; some degree of familiarity with the comprehensive manual and with the physics of space flight are essential to avoid frustration, but links to some useful sources of information are thoughtfully provided on the website.

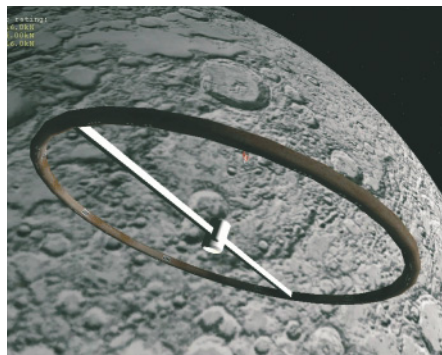
A useful tip for getting down on the runway was provided by an ex-US Navy pilot: just keep the velocity vector planted on the touchdown zone on the runway, manage your speed, and you'll make a successful landing! Landing from orbit can be difficult because, unlike in X-Plane and Shuttle, you have no control over the speed brake.

A little time and effort spent on getting to know Orbiter will reward you handsomely. As a standalone sim which is available as a free download, it's well worth investigating; your routine flights will never seem quite the same again. ■

Matthew Stibbe & Christopher Jarman



Graphically, Shuttle can't compete with more recent software, but it's still a great sim



Not quite your average airport



Try the delta glider once you've mastered the Shuttle

Flight Sim Training



Professional instruction with Bill Stack

The charts used in these tutorials have been specially supplied and reproduced with kind permission of Jeppesen GmbH. These charts are NOT to be used for real-world navigation. They are for information ONLY. © 2002 Jeppesen GmbH.



Instrument reliance in visual weather

Today's flight features an aviation paradox: The weather is above visual minimums, so VFR (Visual Flight Rules) are allowed. The weather, however, is close to instrument thresholds, and conditions at the origin and destination airports are very different. Conditions at our origin airport enable visual flight, while conditions at our destination preclude us from relying on outside visual cues, even though weather stations report conditions adequate for visual flight. So we will end up relying on our instruments and flying as though we were under IFR (Instrument Flight Rules).

In our previous flight we adhered to instrument flight rules in visual conditions, which is a good practice when flying through very congested airspace. In this tutorial we will demonstrate the need for combining visual and instrument flying, and for pilots to make significant decisions en route.

We will fly from Essex County airport (KCDW) near Caldwell, New Jersey, USA, to Martha's Vineyard airport (KMVY) on Martha's Vineyard Island, Massachusetts. Our 170-mile (314km) flight will take us over the northern reaches of New York City, past its suburbs along the Connecticut coastline, and eventually to the charming islands off Cape Cod. It will last slightly longer than one hour.

Essex County airport's website says it's the second-busiest general aviation airport in New Jersey, with 250,000 movements a year and 350 aircraft based there. It is on the western reaches of the New York City

megapolis, and is called Essex County on some documents and Caldwell on others. ATC (Air Traffic Control) in Flight Simulator 2002 calls it Caldwell, but FS2002's map feature calls it Essex County. Whatever it's called, it's the same place. Read more about the airport here: www.co.essex.nj.us/airport1.htm.

Martha's Vineyard is a municipal airport which is busy with tourist and recreational traffic during summer, and relatively quiet during the off season. Its stated average of 165 daily operations is deceiving, because its traffic count is substantially higher than that in summer and much lower in winter. Several small airlines and charter services serve the airport for the public, and daily sightseeing flights are common during summer. This airport is called Martha's Vineyard on some aviation documents and Vineyard Haven on others. Learn more about it at www.mvy.com.

Although the New York City Class B airspace is among the world's busier airspaces, VFR flights are allowed with ATC clearances. Our flight will take us north of its three busy commercial airports, but over busy general-aviation and municipal airports.

Some of you might have recognised this flight from its origin and destination airports and its weather conditions; it's a route flown by the late John F. Kennedy, Jr. numerous times. Conditions simulate those of 16 July 1999, when his young life ended. Our studies of the official NTSB (National Transportation Safety Board)

report on this accident and our flights of this route several times under similar time and weather conditions have led us to the same conclusions. We agree that Kennedy suffered from spatial disorientation, which is a common factor in fatal VFR accidents. This condition makes the flight useful for our tutorial.

We are aware of innumerable theories to the contrary, and we are not opening a discussion of who is right or wrong. We are only using this real-life example to demonstrate several important truths of aviation: First, things are not always as they appear to be or as they are expected to be. Second, criteria for determining VFR or IFR flight do not apply to every conceivable situation or environment. Third, that's why pilots must make quick decisions and change plans as a result of unexpected or changing conditions. Fourth, aviation weather reports are information for pilot decision making; they are not decisions themselves. Fifth, the pilot is the sole authority on his or her flight, and he is fully responsible for it.

If you would like to read the official NTSB report, go to www.nts.gov/ntsb/query.asp#query_start. In the Registration box, enter N9253N, then click on the Submit Query button. We regret that there isn't an easier way to direct you to it.

You will be sure to find this flight interesting, challenging and rewarding.

Spatial disorientation

Spatial disorientation is a mental condition that causes a pilot to be confused about his relationship to his environment. Generally speaking, he loses track of which way is up, down, this way or that way, and faulty decisions invariably result. It is a significant factor in fatal visual flight accidents, according to aviation authorities. It is so common and hazardous that it is covered in depth in the US FAA's (Federal Aviation Administration) Instrument Flying Handbook.

This potentially lethal condition can happen to anyone, so pilots are trained to avoid it or deal with it when it happens. Although it is rooted in physiological conditions inside the human ear, two factors are necessary: the pilot's low proficiency in the use of flight instruments, and failure to trust his instruments once becoming disorientated. Training encourages pilots to avoid flight conditions that could lead to spatial disorientation in the first place. It also focuses on

instrument proficiency, trusting those instruments, testing them to determine if any are indeed faulty, then taking appropriate measures.

Today's tutorial demonstrates the conditions that lead to spatial disorientation and the resultant need for instrument proficiency and rational thought throughout the situation. We found the conditions daunting even in a flight simulator.

Before you start

A few prudent practices that professionals normally apply can make your flights as realistic as possible. The background will also help you enjoy flying while you learn.

SELECT YOUR AIRCRAFT

The Mooney Bravo is a suitable aircraft for this tutorial, because it is similar to the Piper Saratoga used in the actual flight. The VFR version is appropriate, because you will need the outside views that it allows.

KNOW YOUR CHARTS AND PROCEDURES

So you will know what to do during this flight, be sure to familiarise yourself with the relevant aviation charts before embarking. They show the flight path, fixes and navigation aids, and they are fully explained in the main tutorial. As well as the charts reproduced from the Jeppesen SIMCharts program that you'll see in this tutorial, we've included high-resolution images of the charts on the cover CD. For more information see page 9.

PROFESSIONAL FLIGHT PRACTICES

As usual, we steadfastly emphasise the need for following prudent aviation practices. Applying them or not can make the difference between a successful or a failed flight.

USE FLIGHT PLANS

Flight plans are recommended for the most realistic flight simulations. You are free to use paper plans or an electronic flight planner. Paper plans are a bit clumsy to make but easier to use aloft. Electronic plans are easy to make, but using them aloft requires following submenus that disrupt the simulation.

If you use FS2002's electronic flight planner, be sure to select 'VFR', so that ATC will recognise your flight correctly. In lieu of filing your flight plan with ATC as real pilots do, imagine that you have filed in accordance with regulations. Keep your flight plan handy throughout the

flight so you can easily refer to it. After your flight, file it in a folder or loose-leaf notebook.

NOTE THE TIME

We always jot down the time of significant events during our flights, and we recommend your doing this too. Note the time of take-off, the time of passing significant fixes and nav aids, and the time of arriving at the destination airport's airspace. Recording your times and tracking your progress help make the flight more interesting and come in very handy at the destination airport.

COMPENSATE FOR WIND

Be sure to account for winds in your plan, because deviations from your desired course will consume additional fuel and delay your arrival. Our tutorial in Issue 4 explains wind compensation in detail.

MONITOR YOUR PROGRESS AND STATUS

Throughout your flight, check your instruments for the status of your aircraft and engine. Check your position frequently using radio nav aids and/or time/speed/heading calculations. Monitor your engine-temperature, oil-pressure, fuel-flow and fuel-supply gauges. Correct as necessary to maintain desired course, altitude and performance levels. At the end of the flight, compare your estimates to the actual performance in time and fuel consumption.

SIMULATE AIR TRAFFIC CONTROL

Air traffic control for this flight is basically VFR flight following with take-off and landing clearances. Follow the appropriate ATC procedures for VFR nonetheless, because that's what real-world pilots must do.

FLY ONE STEP AT A TIME

While leaping over the basics and plunging into advanced flights is a great luxury of flight simulation, it is not realistic. Real pilots do not start at the end of the training course and work backwards, because it deprives them of the skills needed for meeting subsequent challenges. When flight simmers try to meet challenges for which they are unprepared, they frustrate themselves with poor performance and errors. So we strongly advise doing everything one step at a time and building your skills toward the next levels, just as real pilots do. Pause your sim at any time you consider it necessary, as you will not have a certified flight instructor in your cockpit to help you.

USE THESE TUTORIALS FOR FLIGHT SIMMING ONLY

These tutorials are intended for computer flight simulation, not for real-world aviation or real-world flight training. While making our tutorials as realistic as possible, we have adapted them out of necessity to the limits and nuances of flight simulation, so some aspects cannot and do not apply to real-world flight. Therefore we caution everyone to use these tutorials for their intended purposes, and we accept no liability for anybody's misuse of them.

OUR AUTHORS

Bill Stack is an expert flight simmer and author of several popular flight sim books. Nels Anderson, our technical consultant, is a certified pilot and president of FlightSim.com. Learn more about flying like a real pilot from Bill Stack's five flight sim books at www.topskills.com/flitsim.htm.

Refer to our prior tutorials

If you don't have our previous tutorials, they are all available either in back issues or on our 3-in-1 CDs. A complete list of the subjects covered in previous tutorials is included on the cover CD. For more

details of back issues and the issues available on CD format, see our subscriptions page or the website, www.pcpilot.net.

Is there anything else you would like to see covered in our tutorials? Let us know at mail@pcpilot.net and we'll look into it.

Flight setup

Prepare your simulator for your flight. It takes only a few minutes, and it makes your flight more challenging, more realistic and more fun.

GET YOUR WEATHER BRIEFING

Every VFR and IFR pilot must know weather conditions at origin and destination airports, as well as en route. Although weather for this flight changes slightly, visibility changes dramatically

because of darkness, haze and lack of ground lights. Consequently, the challenges facing the pilot change dramatically. Any pilot who isn't prepared for conditions at his destination has undermined his most important flight function – getting back on the ground

safely. Your weather briefing is available from three sources: the weather settings listed in this tutorial, the weather menu you used for establishing the weather for this tutorial, and the ATIS (Automatic Terminal Information System) message at the airports.

Flight setup (contd.)

SET YOUR WEATHER

Conditions on 16 July 1999 were typical for summer weather in the northeastern United States. Evening temperatures were in the mid 80s F (around 30°C) in New York, and they fell to the mid 70s (around 24°C) by dusk. Although skies were officially reported as ‘clear’, visibility over Rhode Island Sound and Martha’s Vineyard Island was less than three statute miles (4.8km) in a summer haze of urban smog and high humidity. Some pilots flying through the area reported zero visibility. We will set our weather as close as we can to those on the evening of 16 July 1999, within our flight simulator’s capabilities.

Global Weather

Use ‘Global weather’

Clouds: none

Wind up to 3,000 MSL: 16 knots from 235 degrees

Wind up to 6,000 MSL: 20 knots from 240 degrees

Temperature, dew point up to 3,000 MSL: 80°F/27°C, 70°F/21°C

Temperature, dew point up to 6,000 MSL: 70°F/21°C, 60°F/16°C

Pressure: 30.10 inches, 1018.5 millibars

Visibility: 5 statute miles, 8km

Weather at Martha’s Vineyard (KMVY)

Use ‘Local weather’

Clouds: none

Wind up to 3,000: 11 knots from 210 degrees

Wind up to 6,000: 16 knots from 220 degrees

Temperature, dew point up to 3,000 MSL: 72°F/22°C, 62°F/17°C

Temperature, dew point up to 6,000 MSL: 57°F/14°C, 52°F/11°C

Pressure: 30.03 inches, 1017 millibars

Visibility: 3 statute miles, 4.8km

DATE AND TIME

Using the departure date and time of our model flight is crucial to this tutorial’s success. It will give dusk conditions on departure, and darkness by the time you reach Rhode Island Sound, which is exactly what the real-world pilot experienced. Therefore, set the date to 16 July 1999, and set the local time at 20:38.

PREPARE YOUR AIRCRAFT

Be sure to prepare your aircraft for flight before taking off by setting your radios and

gauges and turning on your lights. The following conditions generally apply to most flights.

POSITION YOUR AIRCRAFT

Because the wind at KCDW is from 235, the best runway for taking off will be 22, so start your flight at the take-off point of runway 22.

CALCULATE THE FUEL NEEDED

For a VFR flight we must include enough fuel to reach our destination airport plus enough to remain airborne at cruising airspeed for 30 minutes in daylight and 45 minutes in darkness. Even though our flight will begin in daylight, most of it will be during darkness, so we must use the 45-minute rule today. Our Mooney Bravo uses about 16.5 gallons of fuel per hour from take-off to landing. Based on the legal requirement and the aircraft’s average fuel-usage rate, we estimate today’s flight will need more than 25 gallons and less than 35. What is your estimate?

SET UP YOUR AIRCRAFT

Make your aircraft ready for your flight. ‘Buy’ enough fuel based on your fuel calculations. Your fuel mixture should be rich, and your propeller pitch should be low at these low altitudes. The cowl flaps should be fully open while on the ground and during take-off and climbout. The carburettor heat should be off, because it is not needed and its use will reduce performance when the best is needed. The pitot heat won’t be needed, because the temperatures are far from freezing.

TUNE YOUR RADIOS

Set your Nav-1 and Nav-2 radios and your OBI for the first frequencies and radials you will use.

Com-1: 121.9 (Essex Ground Control)

Com-2: not needed

Nav-1 Primary: 108.8 (Bridgeport BDR)

Nav-1 Standby: 110.85 (Groton TMU)

Nav-2 Primary: 108.8 (Bridgeport BDR)

Nav-2 Standby: 110.85 (Groton TMU)

OBI-1: 087/267

OBI-2: 087/267

ADF: not needed

SET YOUR GAUGES

As standard procedure, set your altimeter for local barometric pressure in accordance with your weather briefing or the airport’s ATIS.

TURN ON YOUR LIGHTS

Beacon, strobe, navigation, landing and taxi lights are needed for this night flight. The taxi light should be turned off after taking off. Strobes may be turned off if

their reflections from clouds present a safety hazard to the pilot. Landing lights are recommended for taking off, landing and whenever flying below 10,000 feet (3,050m) above MSL (Mean Sea Level).

PREPARATION CHECKLIST

(This checklist is for this tutorial only, and is not intended to be complete.)

Aircraft Settings

Engine: running

Fuel supply: per pilot calculations

Fuel mixture: richest

Propeller pitch: highest

Cowl flaps: open fully

Wing flaps: 10 degrees (specified by Mooney)

Carburettor heat: off

Pitot heat: as needed

Rudder: straight

Ailerons: neutral

Elevator trim: neutral

Gauges

Altimeter: local pressure

Amperes: neutral

Vacuum: green

Oil pressure: green

Fuel pressure: 24 psi (specified by Mooney)

Radios

Double check communication and navigation radio frequencies for correctness.

GPS

Do not use your GPS. Evidence suggests that the real-world pilot had lost track of his en route position, so using the GPS or the simulator map undermines the objective of this tutorial.

Lights

Beacon: ON

Strobe: ON

Position (navigation): ON

Landing: ON

Taxi: ON

Simulator

Aircraft runs out of fuel

Make a flight

After you’ve set up your aircraft, make a flight so you can bypass all these efforts on repeat flights of this tutorial. Name your flight ‘Essex Co KCDW 22 TO Bravo PCP19’. In the description box, enter ‘Taking off from runway 22 at Essex County New Jersey USA for Martha’s Vineyard Massachusetts USA in the Mooney Bravo for PC Pilot Tutorial 19’.

IFR (Instrument Flight Rules) Tutorial Part 19

Keeping eyes and options open - instrument reliance in visual weather

Before you begin your flight from Essex County airport (KCDW) to Martha's Vineyard airport (KMOV), prepare your simulator and aircraft in accordance with the previous instructions. Then position your aircraft and review your charts.

KNOW YOUR FLIGHT CHARTS

Because this is a visual flight, we will not need airport charts for departure or arrival. Essex County has no departure charts, anyway. You will, however, find the airport diagrams for both airports very useful. We will use a standard visual sectional chart for the flight's en route portion.

Departure

An established departure procedure with routes and minimums for KCDW was not available in SimCharts, but we found one in the AFD (Airport Facilities Directory) for the Northeast United States. The procedure states: 'Rwy 22 – from departure end turn right heading 230 degrees until 900ft MSL then if remaining in the pattern turn to crosswind; if departing pattern continue straight out or exit with a 45 degree right turn after reaching pattern altitude'. The pattern altitude at this airport is 1,200 feet (366m) MSL, according to the AFD.

Because this procedure doesn't say what to do between 900 and 1,200 MSL, we will improvise three simple steps: After taking off we will turn right eight degrees from the runway's 222 heading to a 230 heading. When a 900-foot (275m) altitude is reached, we'll turn right 45 degrees and head 275 degrees. After reaching 1,200 feet (366m) MSL, we will exit the pattern by turning right 125 degrees and heading 040 degrees.

After completing this published procedure, we will fly parallel to runway 4/22 until north of the airport, then turn right 47 degrees and head 087 toward Bridgeport, Connecticut. We must not climb above 3,000 feet (915m) MSL in this area in order to avoid the New York City Class B airspace. We must also be aware of traffic using the approach procedures for Morristown airport to the south and Teterboro airport to the north. Those procedures encroach into the KCDW airspace.

En route

By using three VORs, we can follow an easy three-leg course along the Connecticut coastline, then across Rhode Island Sound to Martha's Vineyard. The first leg will be from KCDW to Bridgeport VOR (BDR). The second will be from BDR to Groton VOR (TMU). The third will be from TMU to Martha's Vineyard VOR (MVY). This course will take us north of

New York City over its northern and Connecticut suburbs. After Bridgeport, we will lose the dense urban lights as darkness falls.

Notice that we are using the full four-character code when referring to airports and the normal three-character code when referring to nav aids. For example, KMOV refers to Martha's Vineyard airport, and MVY refers to Martha's Vineyard VOR.

Although this course could be navigated visually without reliance on radio navigation aids, we feel that using these VORs would help any pilot stay on course. This is definitely true over Rhode Island Sound between TMU and MVY. The entire course can be plotted on one side of the New York sectional chart.

We will cruise at 5,500 feet (1,678m) MSL, because that is the cruising altitude used on the model flight. The pilot probably flew lower than usual to enable ground tracking in the low visibility.

Arrival/Approach

Because we will fly VFR, we will not take instrument arrival or approach charts with us. Consequently we will not have instrument procedures to fall back on in low visibility when we arrive near the airport. We will therefore align KMOV's runway visually with some assistance from MVY. This VOR is conveniently on the airport grounds.



Taking off from Essex County at hazy dusk

Go-around

If we cannot land, we will execute a go-around instead of a missed approach. The tower would normally vector pilots, or pilots could simply fly a standard left-turn airport traffic pattern.

PLAN YOUR FLIGHT

Based on these charts, lay out the course you will fly from KCDW to KMOV. Include the relevant nav aids, intersections and fixes shown on these charts.

Use traditional paper charts and flight plans or Microsoft's electronic flight planner. Paper charts and flight plans are still useful for seeing our course and estimated times at a glance. If you use the electronic flight planner, be sure to select 'VFR' so ATC will recognise your flight correctly.

Enter the following data on your flight plan:

Departure: Essex County, Connecticut, USA, (KCDW) Runway 22

Arrival: Martha's Vineyard, Massachusetts, USA (KMOV)

Waypoint: Bridgeport VOR (BDR)

Waypoint: Groton VOR (TMU)

Waypoint: Martha's Vineyard VOR (MVY)

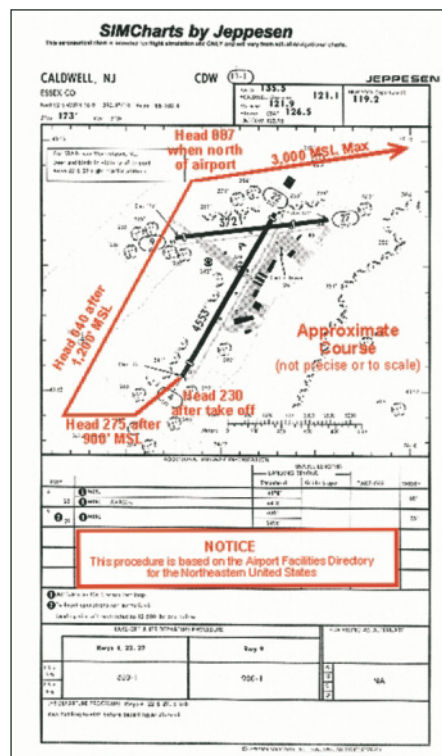
Altitude: 5,500 feet (1,678m) MSL

BEGIN YOUR FLIGHT

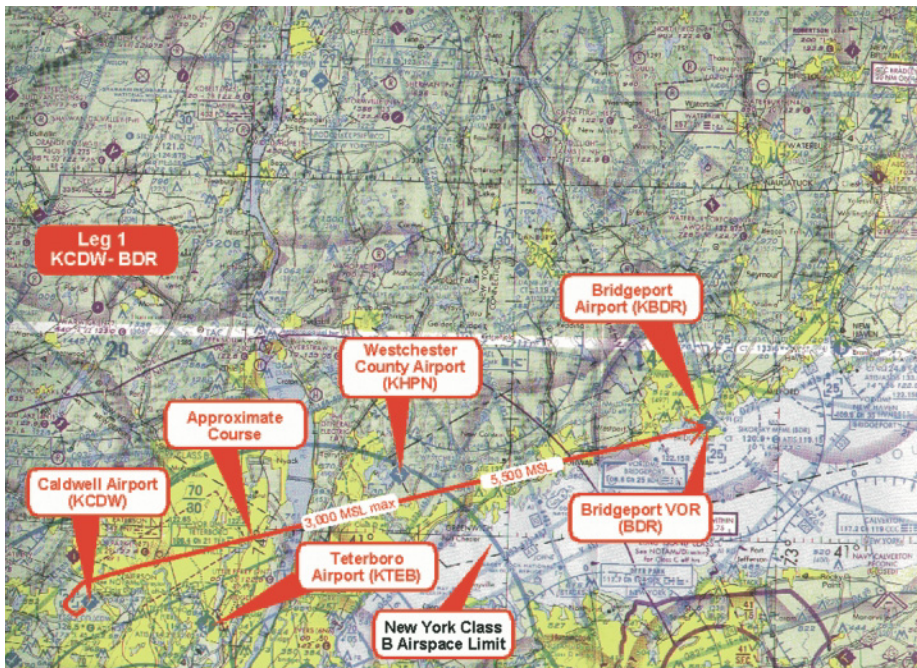
After you have prepared your aircraft, your cockpit and yourself for this flight, contact the KCDW tower for take-off clearances. Follow ATC's instructions, including hand-offs and clearances. If the simulator you are using has no ATC, imagine that you have requested and received all required clearances.

TAKE OFF

Your take-off should begin as soon as ATC clearance is received. In lieu of ATC, set your transponder for 5213, which is the setting we received from ATC.



Caldwell airport diagram



KCDW-BDR VFR chart



Flying visually without horizon

Be sure your clock is set at 20:38 when you take off so your dusk and darkness conditions will simulate those of the model flight.

Check your engine instruments during your take-off roll. The Bravo's manifold pressure should be at or above 38, and the oil pressure should be at least 24. The Bravo should lift off at about 60 to 65 knots. (Different characteristics apply to other aircraft.) If your aircraft isn't performing normally, abort your take-off.

During take-off and climbout on this flight you will have a nice headwind that will help with lift-off.

Turn off your taxi light after taking off, but keep your landing and strobe lights burning throughout this flight because of the darkness.

Adjust your pitch to maintain about 85 knots during your climbout. As you're climbing, adjust your cowl flap to keep your engine temperature in the green range – neither too hot nor too cool. In this warm summer air, you might need to leave it open slightly throughout the flight.

After your initial climbout, your Bravo should be able to climb easily at 700 feet per minute and 120 knots. Retract your flaps when your airspeed reaches 90 knots.

Icing is not going to happen in this hot summer weather, regardless of the humidity, so your de-icers and pitot heat will not be needed.

DEPART ESSEX COUNTY

After taking off, follow the simple departure procedure. Turn right eight degrees and head 230. When you reach 900 feet (275m) MSL, turn right 45 degrees and head 275. When you reach 1,200 feet (366m) MSL, turn right 125 degrees and head 040 on a course parallel to runway 4/22. When you are north of the airport, or when you intercept BDR's 087/267 radial, turn right 47 degrees and head 087 toward BDR. We started receiving this signal shortly after climbing through 1,000 feet (305m) MSL.

Soon after taking off, FS2002's ATC at KCDW handed us off to New York Approach. Once you've contacted New York Approach, request flight following.

NOTAM: Distance measuring equipment (DME) is not available from BDR in FS2002. Although the sectional chart shows BDR as 'VOR-DME', FS2002 shows it only as a VOR and does not provide distance measuring with it.

Climb no higher than 3,000 feet (915m) MSL while within the New York City area Class B airspace. This area is shown on the chart, and it extends to slightly northeast of Westchester County airport (KHPN).

FLY EN ROUTE EASTWARD

The first of our three legs is 55 miles to BDR. We should reach BDR about 20 minutes after taking off. When you are clear of the Class B airspace (just beyond KHPN for this course), climb to our cruising altitude of 5,500 feet (1,678m) MSL.

Follow ATC's hand-offs, and request flight following whenever you join another en route centre. Use ATC's position reports to help plot your progress en route.

Be sure to adjust your fuel/air mixture as you climb to cruising altitude. The higher your engine gets, the less oxygen it will have for combustion, so you will need to decrease the fuel portion of the mixture to compensate. This Bravo engine performs best when the TIT (Turbine Inlet Temperature) gauge reads between 1,600 and 1,700. Adjust the mixture so the TIT is within this range. Do not exceed 1,750. Again, these performance readings do not apply to other aircraft.

Conserve fuel by changing the propeller pitch at higher altitudes. Our Bravo cruised easily at 170 knots indicated, and used 15.50 gallons of fuel per hour with the following engine settings: RPM 2,100, manifold pressure 34, and TIT 1,600. If your engine is using fuel too fast, you could run out of fuel short of your destination. Adjust your settings until your airspeed and fuel-flow rates are optimised.

Some sightseeing is available on this first leg. For most of it we will fly over densely populated suburbs of New York City, and the city lights at dusk will provide something to see. About six minutes after taking off, you will pass north of Teterboro airport, and it will be clearly visible out of your right window. Another minute or so later, the buildings of New York City will be visible ahead and to your right, and the George Washington Bridge crossing the Hudson river will be visible to your right. About five minutes later, you will pass just south of Westchester County airport. It will be visible out of your left windows. From here, you will fly roughly along the Connecticut coastline, with land to your left and Long Island Sound to your right.

An experienced visual pilot could use these landmarks for navigation guidance, but we are relying on VORs just to be sure we don't stray off course.

Without DME, you will need to rely on other means for determining when you arrive at BDR. One method is timing, another method is the OBI (Omnibearing) readings, and ATC provides some guidance.

You should reach BDR about 20 minutes after you depart KCDW. This method is inaccurate, because part of your duration since departure included the airport departure procedure and climbout. But timing will give you a rough idea of when you should arrive at the VOR.

As you get very close to BDR, the CDIs (Course Deflection Indicators) in your OBIs will repeatedly fall off centre and you will constantly adjust heading to compensate. You will know you are at BDR when the OBIs switch from 'To' to 'From', and when the CDIs flip from pointing forward to pointing backwards. These changes will happen simultaneously.

Additionally, ATC told us when we were 14 miles west of KBDR, and BDR is conveniently

at this airport. So we used velocity and distance to calculate the remaining duration of this leg at four minutes.

The second leg will be 50 miles from BDR to TMU. As you pass BDR, turn right and head 091 towards TMU. Write down the time at which you pass this waypoint, and monitor your en route progress on your chart as time passes. Switch your Nav-1 radio to 110.85 for TMU and your Nav-2 radio to 108.8 for BDR. Switch your Nav-1 standby frequency to 114.5 for MVY and your Nav-2 standby frequency to 110.85 for TMU.

To maintain your course on this second leg, set both your OBI dials to 091/271, and keep both CDIs centred. You will track from BDR for six or seven minutes until you receive TMU, then you will track to TMU. The CDI on OBI-2 will be less sensitive as you get farther from BDR, and the CDI on OBI-1 will get more sensitive as you get closer to TMU.

On this 18-minute leg, you will fly over sparsely populated areas with fewer ground lights. This phase will be rather boring, so stay awake and pay attention to your aircraft and surroundings, just like a real-world pilot must do.

About two minutes after passing BDR, you will pass south of New Haven airport, and it will pass by your left windows. You will also see a highway below and to the left. This is Interstate 95, which is a busy expressway between Boston and New York. In another two minutes, you will pass south of Griswold airport.

By now, dusk has turned to darkness, and there isn't much to see outside. Notice that what little you can see is to your left. The chart shows that this course is just a few miles off the coastline, and everything ahead and to your right is water.

We began receiving TMU when 36 miles away. Its DME works, so you can determine your exact position for the remainder of this leg. Notice that the airspeed shown on the DME gauge is considerably higher than that on the airspeed indicator. This difference between ground speed and indicated airspeed results mostly from the 20-knot tailwind at this altitude today, and to some extent from the altitude itself. So your flight duration will be a little bit shorter than estimated on the flight plan.

Halfway through this flight, switch your fuel supply from one tank to the other. Switching them halfway will give you both fuel tanks carrying relatively equal weight when you arrive in KMVY's airspace, and that balance will make manoeuvring your aircraft a lot easier. On this course, this halfway point should be about 30 miles to TMU. Using the halfway point for switching tanks is only a rule of thumb, because your aircraft uses more fuel during the first half of the flight than during the last half. It uses fuel faster during climbs, which are done during the first half,



BDR-TMU VFR chart

and slower during descents, which are done during the last half.

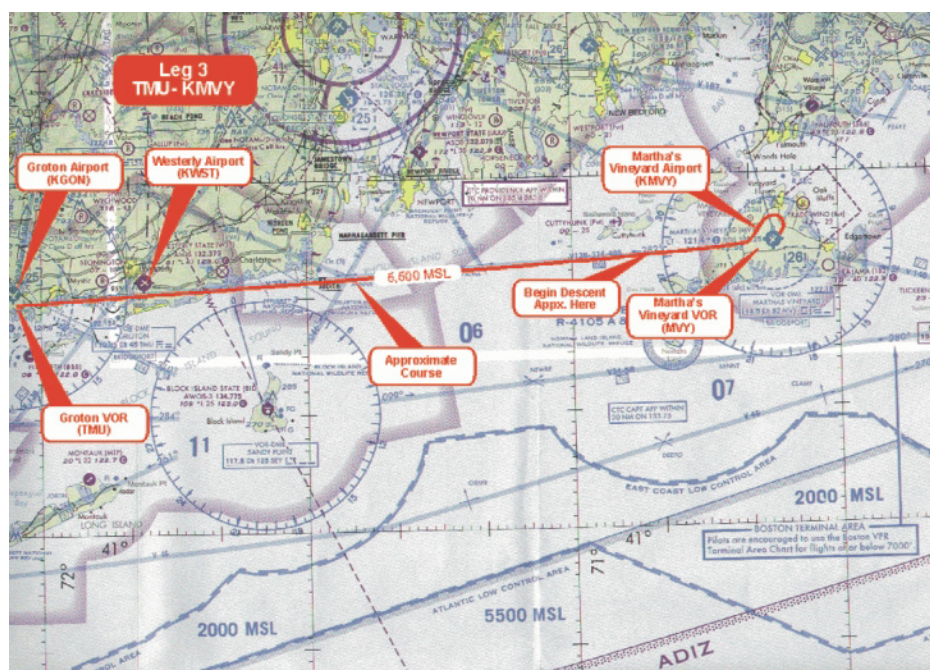
When you are about four miles from TMU, you should see Groton airport straight ahead. This VOR is also conveniently at this airport, which gives us visual pilots a handy and interesting visual reference in the darkness of night.

As you pass TMU, turn right and head 100 towards MVY. Write down the time at which you pass this VOR, and monitor your en route progress on your chart as time passes. Switch your Nav-1 frequency to 114.5 for MVY and your Nav-2 frequency to 110.85 for TMU. Track your progress using your OBIs and CDIs the same way as you did in the previous leg.

For the first half of this 65-mile, 20-minute leg, you will fly over sparsely populated coastal areas with few ground lights for visual reference. For the second half, you will fly over water with no lights at all. Plot your position on your chart using time/speed/velocity calculations and your DME readings from TMU and to MVY.

About three minutes after passing TMU, Interstate 95, which has been our companion to the left for almost 100 miles, will curve to the north towards Providence and disappear into the darkness. This is the last land object we will see until we reach Martha's Vineyard Island about ten minutes from now.

As you fly over Rhode Island Sound, your outside views are nearly zero. There's nothing



TMU-KMVY VFR chart

below and around you but darkness and a visibility-restricting haze. Consequently, distinguishing the horizon is impossible. This complete lack of visual references can lead to spatial disorientation, so pay attention to your instruments and trust their data. You can see how the conditions in this area warrant IFR, even though weather conditions meet legal requirements for VFR. That's the paradox of this flight. Any pilot who thinks he can fly visually in these conditions is fooling himself.

Evidence in the official NTSB report suggests that the real-world pilot lost track of his position during this leg. Radar records show that his aircraft descended from his 5,500-foot cruising altitude to 2,200 feet (671m) when 34 miles from KMVY. Using our reliable 0.003 multiplier, we would have begun descending from 5,500 when about 12 miles from the airport. We suspect that he might have thought he was closer to the airport than he really was, or that he wanted to get a better look at marine lights on Rhode Island Sound for reference. Ultimately, this is all just speculation.

Whatever happened, the evidence points to spatial disorientation beginning about 22 miles from MVY. According to radar records, the aircraft turned right, then left; then it climbed, then it descended. These manoeuvres are not normal for a routine cross-country flight. Soon thereafter the aircraft disappeared from radar.

Don't let this happen to you. Pay attention to your instruments. Trust your instruments. Plot your position continually. Stay on course. Know your position and your aircraft's status at all times.

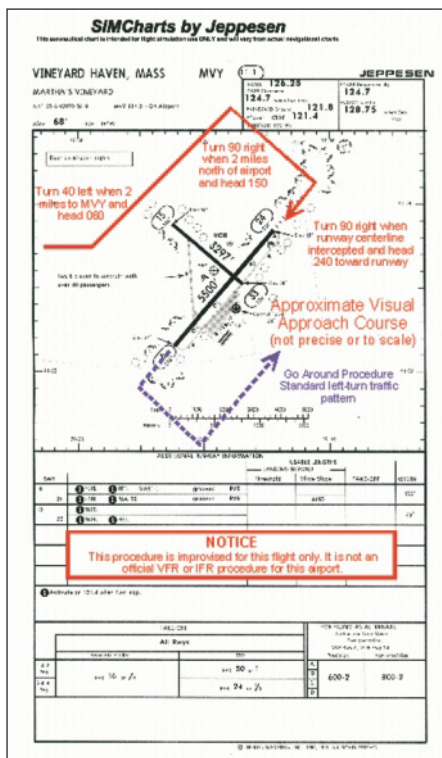
About 17 miles from MVY, we received a hand-off from Providence Approach to Cape Approach.

DESCEND TOWARDS MARTHA'S VINEYARD

When you are 12 miles from MVY, begin descending at 700 feet per minute to 1,000 feet (305m) MSL. During your descent, prepare your aircraft for landing. You won't have much time for it when you arrive in KMVY's airspace. Tune in and listen to KMVY's ATIS, then set your altimeter for local pressure. If you are using an aircraft with a carburettor, turn on your carburettor heat. Even though temperatures are warm, the high humidity combined with the low engine power could foster ice build-up in the carburettor. Get your charts in order and tidy up your cockpit.

When you are about ten miles from MVY, cancel flight following, then contact KMVY Tower and announce your intention to land. Reduce airspeed to 100 knots so you can easily execute your turns in the approach patterns.

Ground lights on Martha's Vineyard Island should become visible when you are about seven miles from MVY. These lights will first appear to your right, then straight ahead.



Vineyard Haven airport diagram

They are not bright, and they don't provide useful navigation guidance.

JOIN THE MARTHA'S VINEYARD PATTERN

During our practice flights, we found that flying the airport traffic pattern for KMVY was very difficult without good ground references and in this low visibility. In fact, we might not have been able to do it without our instrument knowledge. We therefore recommend using MVY for navigation guidance, which fortunately is on the airport grounds. This is an example of mixing visual with instrument procedures, and it is acceptable in unusual circumstances.

Keep close watch on your flight instruments through every phase of this procedure. Be sure your altitude is 1,000, your airspeed is 100 knots, your heading and attitudes are correct, and your turning banks are reasonable. Know your position and status at all times.

Pause any time during this procedure. You will not have a flight instructor or a co-pilot with you to help you perform all these manoeuvres properly in the required sequence and at the correct times.

When you are three miles from MVY, turn left and head 040. This heading change will put you on a right downwind leg for runway 24. Set both navigation radios to 114.5 for MVY. Reduce airspeed to 100 knots. Descend to and maintain 1,000 feet (305m) MSL.

Use your OBI-2 needle and your DME-2 to follow your position relative to the airport. When you are two miles north of the airport, with your CDI showing 010/190, turn right

90 degrees and head 150 degrees for your base leg. Lower your landing gear during this leg, and keep your airspeed at 100 knots. Do NOT fly farther than three miles from the airport, because visibility in haze is only three miles, and the airport will disappear into the darkness.

Use your OBI-1 to help determine when to turn from base leg to final approach. Set the CDI to 240 – the heading for runway 24. As soon as the course deflection needle begins moving toward the centre, turn right and head 240 towards the airport.

Keep in mind that this is neither a localizer nor a VOR approach procedure, so don't mistake it for such. You are improvising with a VOR/DME at the airport for this unusual situation. You are using this navaid only to help you position yourself for landing. Once you see the runway environment ahead, which means the runway lighting, you will fly visually again.

If you've done everything correctly, the runway lights should be visible ahead of you. If so, visually align your aircraft on the runway centreline for your final approach.

LAND AT MARTHA'S VINEYARD

Land normally, remembering a headwind and slightly left crosswind from 210. You might need to remove your instrument panel temporarily or adjust your view screen to see the runway on your final approach. These actions are just like real-world pilots stretching up in their seats to see over the panel.

NEED TO GO AROUND?

If you cannot see the runway environment ahead of you when you are heading 240 and your DME reads less than one mile, execute a go-around. Continue heading 240 and maintain 1,000 feet (305m) MSL. If you see the runway, use it for reference during your go-around. After passing the opposite end of the runway, turn left and follow a standard left-turn traffic pattern. Stay close enough to keep the runway visible throughout this procedure. If you lose sight of the airport, fall back on MVY for position guidance.

CONGRATULATIONS!

You have successfully flown through one of the world's busier airspaces without getting in anybody else's way. You also flew VFR in visibility that legally allows VFR but effectively requires IFR. And you reached your destination safely. Well done, indeed!

We all know the outcome of the model flight. This simulation shows the need for reliable information and sound pilot decisions when required. Keep flying this tutorial to build your proficiency in these conditions. See you next time.

Bill Stack

Saitek P8000 Command Pad

Take control of your keyboard



Flying an aeroplane is undoubtedly a complex task, but one of the things that make flight simulation possibly even more complex is the sheer number of keyboard controls you have to master. Saitek has recently released a device that should lighten the workload for the sim pilot – a keyboard command pad that has 35 programmable buttons and a special frame that accepts your own keyboard overlays on top of the buttons for easy recognition.

The unit also includes a [Shift] key that effectively doubles the number of programmable keys to 70, and an eight-way hat switch and a fire button. The idea is that you can assign multiple keystrokes to each button, saving you having to memorise the different key combinations or fumble with the keyboard while you're trying to fly. Folding legs that allow it to straddle a normal keyboard are a useful space-saving feature.

The Command Pad connects to your PC via a USB port, which should make installation straightforward, but it seems that Saitek are having a few problems getting their driver to work with Windows XP. There was no mention of this in the documentation, yet when we finally exhausted all other avenues

and went to the Saitek website, we found an entry right at the bottom of the support page stating that the P8000 is not currently supported under Windows 2000 or XP! A further hyperlink finally led to a beta driver that does work, although installing it could prove traumatic for those unfamiliar with the black art of driver installation.



One of Saitek's own templates

Two frustrating hours later it was working and, as it happens, very well too. You're presented with a 3D graphic of the unit on the left, and a scrolling list of keys on the right; in order to programme a particular key, you simply highlight it with the mouse and then type in the key or key combination you want the button to emulate.

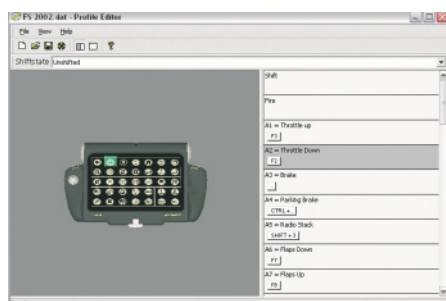
Once you've accepted the definition, you can type a description above the box to serve as a reminder. You can also create keyboard macros, which are very similar to multiple keystrokes, except that when you use a macro you don't need to hold the

down arrow key until the sequence is complete. You can also adjust the timings within the macro, so that the keys are pressed much faster than you could possibly do manually.

When you've finished defining the keys you can save the completed set as a game profile, which can be loaded each time you fly a particular sim. Finally, using the supplied template, you can print an overlay representing your own key assignments to fit over the default key icons; there are a few rather nice examples available for download from the Saitek website. Incidentally, you don't have to put the Command Pad away when you've finished flying; the P8000 can be very useful as a method of providing keyboard shortcuts in numerous other applications.

Although the P8000 functions very well, its credibility will remain questionable until Saitek get the driver issues sorted out. If you're using a version of Windows other than XP, then perhaps this is irrelevant, but don't forget that you're likely to need to upgrade at some point.

Joe Lavery



Programming the unit is simple and intuitive

Review Score



Manufacturer: Saitek

Price: £29.99

Website: www.saitek.co.uk

At a glance: A useful keyboard replacement that provides a much quicker method of interacting with your software applications, although the drivers leave a lot to be desired.

System Requirements: Pentium 166, 32Mb RAM, Windows 98 or ME

Recommended: PIII or Athlon 1GHz+, 128Mb RAM, 32Mb graphics card

Downloads

Star performers from the Internet

Our Downloads editor is always looking for something new and unusual to recommend from the thousands of files uploaded to the numerous flight simulation websites, so if you've downloaded or designed a file which you think is worth sharing, please let us know. Once again we would like to thank all those authors who have allowed us to include their outstanding aircraft, scenery and utilities on our cover CD. Public acknowledgement of their skills is often their only reward. If you enjoy a particular file, then please drop the author a line of thanks – they'll appreciate the feedback.



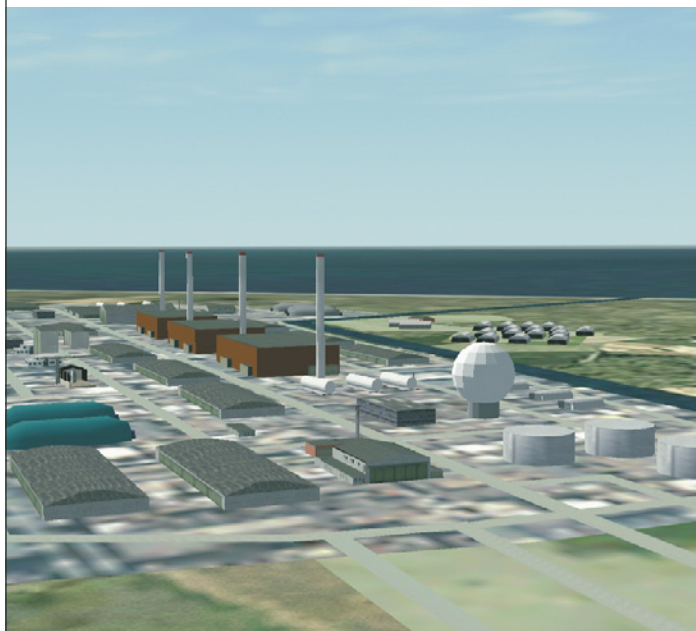
The Isle of Usedom Scenery



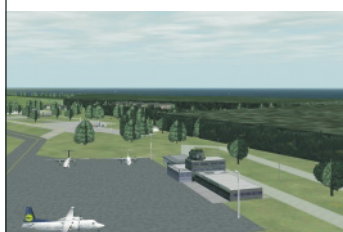
Flight Simulator 2002

Authors: Georg Karbowski and Michael Spengler

The town of Anklam



Detail is exceptional throughout



It's not often that we find a scenery file that's worthy of our Star Download award. This is certainly not because of any issues about quality – the vast majority of freeware scenery is of an exceptionally high standard; it usually consists, however, of a single airfield or perhaps the area around the designer's home, which tends to limit the level of interest from other flyers.

This latest set of files from Georg Karbowski and Michael Spengler covers a wide swathe of land in the northeast of Germany, and includes the Island of Usedom, which is the second largest and, according to the authors, the most beautiful of the German Baltic islands. It's situated at the mouth of the river Oder, and is separated from the mainland by the rivers Swine and Peene. It has 40km of beautiful fine sandy beach, skirted by lakes, forests and hills, together with the seaside resorts of Ahlbeck, Heringsdorf, and Bansin stretching along the coast like a string of pearls.

The scenery package contains three airports on the island – the regional airport of Heringsdorf EDAH, Peenmünde EDCP and UL-Airfield Mellenthin. Also included are several other airfields on the mainland, all of which are a pleasure to visit. If you fancy a little seaplane touring, then you'll find seaports at the former harbour of the East German army in Peenemünde, at Wolgast and Schlossinsel, and half a dozen others dotted up and down the coast, all providing opportunities for water landings and anchorage facilities.

It's the detail around this scenery that will surprise you, not only because of the proliferation of custom buildings and other objects, but also because of the exceptional degree of detail they've achieved. Features such as the piers stretching out to sea, boats, bridges, and cranes, not to mention the buildings around the airports, are all detailed to the very highest level. This really is one area of the world worth getting to know, and our grateful thanks to the authors for their permission to include it on this issue's cover CD.

Joe Lavery

A quick sightseeing trip just isn't possible – take your time and enjoy it all!

The rest of the best... all on the cover CD



**Beechcraft
Super 'G' 18**
Prop Aircraft
Flight Simulator 2002

Author: Greg Pepper



**De Havilland
Mosquito B.Mk IV**
Prop Aircraft
Flight Simulator 2002

Author: Mark Harper



1909 Bleriot XI
Prop Aircraft
Flight Simulator 2002

Author: Joe LoGrasso
Dynamics: Bill Lyons



**Hawk Lead-In
Fighter Trainer**
Jet Aircraft
Flight Simulator 2002

Author: David Brice
Panel: Jeremy Caesar
Sound: Aaron Swindle



**Head-Up
Guidance System**
Gauge Utility
Flight Simulator 2002

Author: Jon Gibbs



**Sukhoi
Su-27K Flanker**
Jet Aircraft
Flight Simulator 2002

Author: Peter Davies



**Replacement
Textures
Scenery**
Flight Simulator 2002

Author: Gerrish Gray



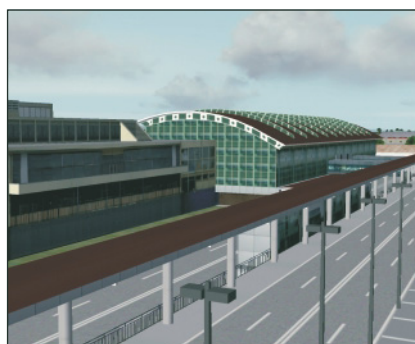
ATR 42-500
Prop aircraft
Flight Simulator 2002

Author: F. Sánchez-Castañer



**Evergreen
MD DC-9-33F**
Jet Aircraft
Flight Simulator 2002

Author: Lynn Rogers



**San José Costa
Rica Intl. Airport**
Scenery
Flight Simulator 2002

Author: Rodrigo Gonzalez



Stoenworks Aviation CD

A compact collection

growing steadily over the last few years, and a further 500 pages! While not all of it directly concerns flight simulation, the 200 pages devoted to FS tutorials are worth the asking price on their own, and cover in depth almost any subject you care to mention – in-depth explanations of cockpit instruments, the nature of stalls, charts, flight planning, navigation, radio communications, every kind of approach – and that really is just scratching the surface of what's available.

If you've ever been baffled by VOR-DME approaches and runway markings, or are having trouble perfecting your landings, you're in good hands. Everything is presented in a manner that's easy to read and understand, and the amount of information available here is staggering.

Hal Stoen, the man behind the Stoenworks, Inc. website, spent 25 years being paid to fly planes – as a flight instructor and a corporate airline pilot – and clearly enjoyed them immensely. For a mere \$12.50 (£8.00 approx.) you can get the benefit of his many years of aviation experience and a great deal more besides.

The CD contains a whopping 952 pages of aviation-related material in PDF format, which are easy to find your way around thanks to the index system. The content of the CD actually includes the entire aviation section of Hal's website, which has been

Almost 200 pages are devoted to Cessna's 421B, a plane which Hal knows inside out; the complete owner's manual and the FAA flight manual may not be the sort of thing you want to read from cover to cover, but such items aren't particularly easy to come by, unless you happen to be the lucky owner of the real thing, but dipping into them is rewarding for those who crave technical details.

Tales from Hal's flying days are included (how can you possibly fail to be interested in a memoir entitled *Elvis, John Denver and Me?*) along with sales brochures, press advertisements and aircraft specifications.

The Stoenworks Aviation CD provides education and entertainment in equal measure – a real bargain.

Joe M. Besser

Review Score

Publisher: Hal Stoen

Price: \$12.50 (£8.00 approx.) inc. worldwide p&p

Website: www.stoenworks.com

At a glance: A vast information resource, and at an unbeatable price.

Military Aircraft Recognition & Civil Aircraft Recognition

Cookpot or Crusty?

Most of us just can't resist peering into the sky at the first sound of a plane overhead, and these two recently published books from Airlife are just the job when you can't quite put a name to the plane. Once you've seen a picture of the Scaled Composites Proteus, you're unlikely to forget it, but telling Cessna's Citation Excel and X models apart is rather more difficult. They make no claim to be comprehensive guides, but these two books do include the great majority of aircraft you're likely to come across, which makes perfect sense for volumes intended to be pocket-sized and portable.

Each aircraft is listed alphabetically alongside a colour photograph, performance specifications and dimensions, and some explanatory text which is a model of concise editing. Detailed three-view structural silhouettes (from above, side and front) are also illustrated, although the view from below would have been a welcome addition. Recognition features outlining the notable characteristics of each aircraft are especially useful, and you'll soon learn to spot those features of an aircraft that make it

instantly recognisable, whether they are the huge wing gloves of Grumman's F-14 Tomcat or the three oval cabin windows of the Raytheon Premier I.

Both volumes contain a handy glossary tailored to their particular subject matter, a general guide to aircraft recognition, and some brief but useful reference sections. GA enthusiasts will appreciate the lists of airport codes, principal world airlines and registration prefixes, while those whose interest lies in combat aircraft are provided with Warsaw Pact aircraft codenames, USAF unit and base codes, and international military markings.

A pocket-sized book can't be expected to contain the amount of detail you might expect from a complete reference volume but, given the size limitations, the contents are spot on. Neat finishing touches, such as a durable cover and rounded corners, show that as much thought has gone into the design of the books as their contents, and should ensure that one of them will always find its way into a spare pocket.

Joe M. Besser



Review Score

Publisher: Airlife Publishing

Price: £7.99 each

Website: www.airlifebooks.com

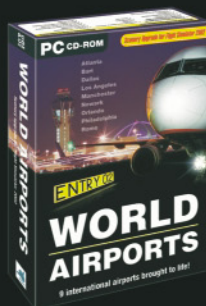
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